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ABSTRACT

The studies in this monograph are designed to examine the implementation processes of an innovative instructional program and the relationship between the implementation process and the achievement of certain program goals in school settings. The monograph is a contribution to the technical aspects of designing and implementing innovative educational programs in general, and the implementation of individualized instructional programs in school settings in particular. The studies reported were conducted in two public elementary schools, one located in an inner city neighborhood in Pittsburgh, and the other located in a working class neighborhood in a suburb of Pittsburgh. Specifically the monograph is a series of research studies carried out during the developmental stages of an instructional learning management system, the Self Schedule System. It includes: (a) a brief description of the conceptual design of the Self Schedule System, which was created to implement the individualized instructional programs developed at the Learning Research and Development Center (LRDC) of the University of Pittsburgh; (b) the documentation of the implementation processes adopted to field test the Self Schedule System in school settings; (c) research findings on the effects of the Self Schedule System on student and teacher classroom behaviors, as well as student learning outcomes; and (d) evaluation of the Self Schedule System from the teacher's perspective. (DMT)

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LEARNING RESEARCH AND DEVELOPMENT CENTER

1976/9

THE SELF-SCHEDULE SYSTEM FOR INSTRUCTIONAL-LEARNING MANAGEMENT IN ADAPTIVE SCHOOL LEARNING ENVIRONMENTS

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1976

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Abstract

The monograph is written to document a series of research studies carried out during the developmental stages of an instructional-learning management system, the Self-Schedule System. It includes: (a) a brief description of the conceptual design of the Self-Schedule System, which was created to implement the individualized instructional programs developed at the Learning Research and Development Center (LRDC) of the University of Pittsburgh; (b) the documentation of the implementation processes adopted to field test the Self-Schedule System in school settings; (c) research findings on the effects of the Self-Schedule System on student and teacher classroom behaviors, as well as student learning outcomes; and (d) evaluation of the Self-Schedule System from the teacher's perspective.

The monograph should be of particular interest to program developers who are concerned with the implementation and the evaluation of innovative instructional programs in school settings in general, and the individualized approach to instruction in particular.

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PREFACE

To find ways to effectively implement the various aspects of educational programs in school settings is a common concern of educators in general, and educational program developers in particular. In spite of the increasing awareness in recent years of the close relationship that exists between the implementation processes of an educational program and program effectiveness, very few empirical investigations have been carried out to study the effects of the implementation process on program outcomes. In fact, there is virtually no systematic documentation of this relationship.

The studies reported in this monograph are designed to examine the implementation processes of an innovative instructional program and the relationship between the implementation process and the achievement of certain program goals in school settings. The monograph is aimed to contribute to the technical aspects of designing and implementing innovative educational programs in general, and the implementation of individualized instructional programs in school settings in particular.

Specifically, the monograph is written to document a series of research studies carried out during the development of an instructional-learning management system, the Self-Schedule System, designed for classroom implementation of the individualized instructional programs developed at the Learning Research and Development Center (LRDC) of the University of Pittsburgh. Papers included in the monograph focus on the documentation of (a) the processes of implementing the Self-Schedule System in school settings, (b) the effects of the Self-Schedule System on student and teacher classroom behaviors, (c) student learning outcomes under the Self-Schedule System, (d) the school administrator's role in the implementation of an innovative program,

and (3) the evaluation of the Self-Schedule System as an instructional-learning management tool from the teacher's perspective.

The studies reported in the monograph were conducted in two public elementary schools, one located in an inner-city neighborhood in Pittsburgh, and the other located in a working class neighborhood in a suburb of Pittsburgh. The schools, which serve as the developmental schools for the Learning Research and Development Center (LRDC), use the individualized instructional programs designed by the Center. A brief description of the individualized programs is included in Appendix A.

The monograph begins with a brief introductory paper by Wang, the developer of the Self-Schedule System, to provide the readers with a general overview of the rationale and design of the Self-Schedule System. The second paper, "The Effects of the Self-Schedule System on Teacher and Student Behaviors," by Wang and Stiles reports empirical findings on the effects of the Self-Schedule System from a series of experimental studies that have been carried out during the past three years in the LRDC developmental school located in the inner-city neighborhood. The results of the studies were analyzed in terms of (a) student classroom behaviors, (b) teacher instructional behaviors, (c) achievement of certain program goals, and (d) student learning outcomes. Data are presented on the results of classroom observations, student progress records, and student and teacher interviews. The third paper, "Implementation and Evaluation of the Self-Schedule System in an Adaptive School Learning Environment," is co-authored by Ruth Stone, the principal of the LRDC developmental school located in the suburbs of Pittsburgh, and Larry Vaughan, a LRDC research staff member responsible for monitoring the implementation of the LRDC programs in the school. The paper includes detailed descriptions of the procedures the principal and the LRDC program implementer used in training the teachers to adopt the Self-

Schedule System in their classrooms, and the feedback mechanism they used to obtain the necessary formative evaluation data to improve the implementation procedures. Emphasis is placed on the discussion of approaches and methods used to solve certain specific problems encountered during the implementation process. In addition to the descriptive account of the implementation processes, the authors also present some research data collected from two classrooms for illustrative purposes. The data document the effects of the Self-Schedule System on: (a) the rate of student mastery of curriculum units, (b) teacher use of available school time, (c) student use of available school time, (d) teacher attitudes, (e) student attitudes, (f) the utilization of classroom aides, (g) the utilization of classroom space, (h) the level of authority and responsibility shared between the teacher and student, and (i) general efficiency in implementing the LRDC individualized instructional program.

In the final paper, "Implementation of the Self-Schedule System: The Teacher's Perspective," by Smith, the author discusses, from a teacher's perspective, her own assessments of the Self-Schedule System in terms of the instructional-learning processes, student learning behaviors and outcomes, as well as the management of the LRDC individualized instructional programs in school settings. The discussion focuses on the effects of the system on the functioning of the teacher in achieving the goal of adapting instruction to the learning characteristics of the individual child.

The studies reported in the present monograph represent unique attempts to systematically conduct developmental and evaluative research during the design of an instructional-learning management system for an innovative educational program. The management system is treated not only as an integral component of the educational program, but also as an independent variable which serves a mediatory function in the achievement of certain program goals. Therefore, the

documentation of the developmental and evaluative research described in the papers and its implications for the design of learning environments that are adaptive to learning needs of individual students should be of particular value to program developers who are concerned with the implementation and evaluation of innovative programs.

Margaret C. Wang
Pittsburgh, Pa.
September, 1975

THE SELF-SCHEDULE SYSTEM: A BRIEF DESCRIPTION

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The Self-Schedule System (Wang, 1974a) is an instructional-learning management system designed as an approach to the implementation of individualized instructional programs in general, and the implementation of the individualized instructional programs developed by the Learning Research and Development Center (LRDC) in particular. (See Appendix A for a brief description of the LRDC program.)

The Self-Schedule System is designed with the rationale that the adequacy and the effectiveness of an instructional-learning management system is the key, not only to the successful implementation of any educational program designed to adapt to the learning needs of the individual student but, more importantly, to the development of the student's ability to interact with, to manage, and to control the learning environment. The use of the word "management" in this context refers to the management of the instructional-learning environment, as well as the instructional-learning process.

The Self-Schedule System is designed with the assumptions:

1. That to provide educational experiences that are adaptive to the learning needs, interests, competencies, and learning rate of each student, alternative learning environments (e.g., a variety of learning activities of different natures and contents) must be made available to students at all times during the school day.

2. That to develop competence in self-directed learning, the student must be given the opportunity to develop skills in making choices among learning alternatives, making plans for his/her own learning, scheduling his/her own activities, and increasing management of his/her own learning independently.

3. That one way to increase teacher time for instructional purposes is to transfer most of the traditional teacher management duties, such as scheduling, distributing learning materials, enforcing class management rules, etc., to students.

4. That to provide flexibility in the instructional-learning processes demands careful preplanning on the part of the teacher and a certain degree of structure in terms of the management of the learning environment (e.g., the use of instructional-learning materials, the use of classroom space, procedures for using certain equipment, etc.).

5. That explicit statements about the expected teacher and student roles and their classroom behaviors will not only increase efficiency, adaptability, and flexibility within the implementation of the program in classroom settings, but will also increase the instructional-learning processes.

Under the Self-Schedule System, no specific time is scheduled for any given type of activity. Opportunity is provided for the student to take responsibility in scheduling his/her own pace during the school day (i.e., the student can decide when to work on the learning activities prescribed by the teacher in the various prescriptive curricula, and when to work on the exploratory learning tasks of his/her own choice). In other words, under the Self-Schedule System, the students are given the opportunity to make their own decisions on when they

will do what: however, some parts of the what are prescribed by the teacher.

The Self-Schedule System is primarily aimed to provide workable management "tools" with which both the teacher and the students can experience success in achieving certain specific objectives included in a given instructional program. "Successful teaching experiences" under the Self-Schedule System means that the teacher is able to: (a) adapt the instruction and the learning environment to the individual student's needs, interests, styles, and competencies; (b) provide a greater flexibility in the planning of the individual student's learning programs and in the use of school time, space, materials, and activities and, at the same time, insure mastery of basic skills included in the various basic skills curricula; (c) provide the learning opportunities and create a psychological climate that is conducive to fostering in students those general cognitive, social, and independent learning skills included in the exploratory learning component of the program; and (d) carry out the specific instructional roles specified by each of the curriculum components and, at the same time, implement all aspects of the program in an integrated and complementary fashion.

"Successful learning experiences" for the student means that the student is able to: (a) achieve mastery of the basic skills included in the prescriptive learning component; (b) develop the self-confidence in his/her ability to achieve in school; (c) acquire self-management skills required to function in classrooms operating under a particular instructional program; (d) develop independent learning skills to carry out and complete his/her learning tasks with minimum assistance from the teacher; (e) develop self-directed learning skills to plan and evaluate his/her own learning; (f) develop the motivation to acquire new skills and knowledge with intrinsic interest and personal involvement, as well as the persistence to work on a task or solve a problem until completion; (g) acquire the competencies to communicate with and

relate to others (peers and adults); and (h) develop social skills to work and interact with others (peers and adults).

The explicit specification of teacher and student roles is one of the key features of the Self-Schedule System. The overall concern of the system is to provide ecological supports for the teacher to achieve the program goal of adapting instruction to the individual students, and for the students to assume increasing responsibilities for their own learning. If the system is effective, we should be able to observe the following outcomes:

1. Students will interact with teachers significantly more on instructional matters, and less for classroom management purposes.
2. Students will engage in different learning activities, varied in their approaches and content.
3. Students will spend significantly less time "waiting" for the teacher.
4. Students will exhibit more purposeful and attentional behaviors and less disruptive behaviors.
5. Students will exhibit increasing control of their own learning. (Some examples of student behaviors under this category would be to engage in more self-selected activities and complete more tasks.)
6. Students will exhibit increasing mastery of self-management skills. (For example, students will be able to follow prescriptions independently, locate learning materials and equipment, carry out such material management responsibilities as clean up, return used materials to proper storage space, etc., without teacher assistance.)

7. Students will increase their rate of task completion significantly.

8. Students will acquire mastery of skills included in the prescriptive curricula at a faster rate.

9. Students will exhibit increasing amounts of interest and motivation for learning as well as personal involvement. (Some examples of student behaviors under this category would be persistence in working on a task or solving a problem until completion, initiation of learning projects that require a great deal of work and stamina on the part of the students, and an increase in school attendance.)

10. Students will engage in group collaborative projects more frequently.

11. Students will interact with each other more frequently.

12. Students will exhibit increasing levels of mastery in social skills. (Some examples of behaviors would be taking turns using equipment and materials; sharing materials, ideas, and activities; and communicating ideas, needs, and feelings to others in socially acceptable ways.)

A more detailed description of the Self-Schedule System and the procedures used for implementing such a system in classroom settings can be found in another paper by Wang (1974).

Reference

Wang, M. C. The rationale and design of the self-schedule system. Pittsburgh: University of Pittsburgh, Learning Research and Development Center, 1974. (Publication No. 1974/5)

EFFECTS OF THE SELF-SCHEDULE SYSTEM ON TEACHER AND STUDENT BEHAVIORS

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Over the last three years, a series of experimental studies have been conducted to investigate the effectiveness of using the self-scheduling approach to implement the LRDC individualized instructional programs in school settings.

The three studies reported in the present paper were carried out as part of an ongoing series of formative evaluation studies aimed to refine the design of the Self Schedule System (Wang, 1974a) and to investigate in depth the effects of the system on classroom instructional-learning processes as well as the behaviors of teachers and the students. The studies were conducted in the preschool and primary grades of the LRDC developmental school located near a housing project in an inner-city neighborhood in Pittsburgh. The neighborhood is made up of predominantly low income Black families. The Self-Schedule System was developed and initially implemented in the preschool classrooms in this school in 1972. Based on the findings obtained from the Preschool Study, the Self-Schedule System was further refined and field tested in the first and second grades in subsequent years.

The repeated measure experimental design was adopted as the general design for the studies reported in this paper. The studies generally included baseline periods during which measures were taken to obtain data on variables that we predicted would be significantly affected by the Self-Schedule System, and experimental periods during which data were obtained to verify our predictions.

During the baseline periods of the studies, the school day was divided into time blocks that were specifically scheduled by the school administrators and/or by the teachers for instructional and learning activities in the various curriculum areas included in the program (e.g., reading, math, spelling, gym, etc.). This particular schedule system adopted during the baseline periods, which we have come to call the Block Schedule System, is very much like the scheduling system adopted in most of the traditional public elementary schools. Under the Block Schedule System, all the students are required to engage in learning activities of a given subject area at the specifically designated time period. Each student is required to complete all the assignments prescribed by the teacher for that subject area during the specified period. Furthermore, students who complete their assignments prior to the end of that period are given either additional assignments in that subject area or some "seat work" to occupy their time until the end of the period.

During the experimental periods, a different scheduling system--the Self-Schedule System--was implemented. Under the Self-Schedule System, no specific time period is assigned for carrying out activities for any given subject area except for group lessons involving the whole class (e.g., gym, science, etc.). The students receive the same amount of daily assignments for each of the subject areas as under the Block Schedule System; however, the students can work on the learning tasks in any of the subject areas included in the program at any time during the school day. The students are expected to complete the daily assignments prescribed by the teacher as well as the activities or tasks they have selected for themselves to complete for a given school day before the end of the school day.

The Preschool Study

The Preschool Study was designed as a pilot study to investigate the effectiveness of the Self-Schedule System on student task completion rates and test passing rates. Particular emphasis was placed on studying the feasibility of using the Self-Schedule System to implement the prescriptive and exploratory learning components of the LRDC individualized instructional programs in preschool settings. Also, the study was designed to find out what, if any, aspects of the design of the Self-Schedule System needed to be modified to meet the demands of the implementation of the LRDC program, as well as to identify changes that might be required in the LRDC program to facilitate the achievement of the goals of the Self-Schedule System.

Subjects

All of the children enrolled in one of the two preschool classes in the school served as subjects for the study. The teacher volunteered her class to participate in the study. The class included 14 children, 7 boys and 7 girls. The mean chronological age (CA) of the children at the time of the study was 4 years, 7 months.

Setting

The school day for the preschool was from 8:30 a.m. to 11:30 a.m. During the baseline period of the study, the 3-hour school day was divided into four time blocks: the prescriptive learning period, the exploratory learning period, "juice time," and group time. The prescriptive learning component of the preschool program consisted of the Perceptual Skills Curriculum, the Classification and Communication Skills Curriculum, and the Quantification Skills Curriculum. The exploratory learning component included activities in creative arts, sociodramatic play, block construction, language arts, music, etc. The instructional staff included a teacher and an aide.

Design

During the baseline period of the study, the Block Schedule System was adopted. Students were required to work on their prescribed tasks during the prescriptive learning period and following completion of the tasks assigned to them during the prescriptive period, the students were either given additional assignments or, at the discretion of the teacher, permitted to work on certain exploratory learning tasks of their own choice. Those who completed all their assignments within the prescriptive period were given a star on their prescription tickets and were permitted to take the tickets home on that day. The prescriptive learning period was scheduled for 90 minutes. During the exploratory period, all of the students were required to work on exploratory learning tasks of their own choice. The exploratory learning period was scheduled for about 40 minutes. The remaining 50 minutes of the preschool day was scheduled for juice time and group activity time. Children usually had a group story time, a group discussion time, and/or a group outdoor activity time after juice.

During the experimental period of the study, the prescriptive and exploratory time blocks were combined to form one work period during which the children could choose to work on either prescriptive or exploratory tasks. Although the students received the same amount of prescriptive assignments as they previously had during the baseline period, and they had approximately the same amount of time (2 hours) to work on their prescriptive and their exploratory tasks, they now had the responsibility for scheduling their own activities. The students were expected to complete their prescriptive assignments and at least one exploratory activity of their own choice before juice time.

Compared to the baseline period, the only change made during the experimental period was that students were given the opportunity and the responsibility to decide when to do their prescriptive and their exploratory tasks during the first two hours of their school day.

Measures

Two measures were used in the analysis of student learning outcomes for this study--the student rate of test passing in each of the curricular areas and the student task completion rate. The rate of test passing was computed by dividing the total number of tests passed by the number of school days included in each period. The student task completion rate was computed by dividing the total number of tasks completed by the total number of tasks assigned per day.

Results

The rate of task completion of every student increased during the experimental period. The increase in the rate of task completion from the baseline period to the experimental period was statistically significant ($p < .01$). The mean percent of task completion was 97% during the experimental period, while the mean percent of task completion during the baseline period was 86%. Over 95% of the students completed all their assignments every day during the experimental period. These results suggest that when given the opportunity, 4-year-olds are capable of planning their own schedules and completing the learning activities that they are expected to complete within the specified amount of time.

An increase in the rate of test passing from the baseline period to the experimental period of the study was found; however, the differences were not statistically significant. The mean test passing rate during baseline was 1.30 and the mean test passing rate for the experimental period was 1.90.

Discussion

The overall results, coupled with the feedback information obtained from the teachers, suggest that it is possible for one teacher

and one aide to implement the LRDC individualized instructional programs under the Self-Schedule System in preschool settings. Moreover, children as young as four years old can learn to function in learning environments that require some form of self-directed learning and can successfully meet the demands placed upon them by such a system as the Self-Schedule System.

Several very interesting effects were observed through the course of this pilot study. In addition to the positive results on student learning outcomes, the Self-Schedule System was also favorably received by the teacher. In fact, because of the success the teacher had in implementing the Self-Schedule System and the positive changes she observed in her students and on their own instructional processes, she and her aide refused to return to the baseline model, the Block Schedule System, during the reversal period which we had originally designed for inclusion in the study. Although this refusal to return to the baseline model may have affected the credibility of our findings to some extent, it was important to honor the teacher's wishes and dropped the reversal period from the study. Since this study was designed as an exploratory pilot study, the validity of the results from the research design point of view was not as important to us as was getting assurance of future cooperation from the teachers in that school. In spite of the pilot nature of the study and the weakness inherent in the experimental design, we learned a great deal from the data obtained from this study. The results suggested a great number of very interesting directions to take in our research and development work in this area. In fact, the refusal to return to the baseline model by the teacher was viewed as one positive indicator of the effectiveness of the Self-Schedule System.

One of the most interesting observations made during the Preschool Study, which we did not originally plan to measure in this study, was the quality and the nature of the interaction between the teacher and the student. Informal observations as well as feedback obtained

from the teacher strongly suggest that the Self-Schedule System affected, to a great extent, the classroom behaviors of the students as well as the teachers. Therefore, the documentation of teacher and student classroom behaviors became one of the major focuses in our subsequent studies of the effects of the Self-Schedule System.

It is of interest to note that the information obtained from this pilot study not only provided formative input on the design of the Self-Schedule System, but also suggested some relevant areas for further development and refinement of the LRDC individualized instructional programs. For example, the fact that students significantly increased their task completion rates during the experimental period, and that the increase in task completion rates did not bring about significant increases in test passing rates, suggests the need to examine the nature and effectiveness of learning tasks included in the program, as well as classroom practices. This particular result is also in agreement with the findings from our previous research on this topic. We found that the rate of test passing is affected by many factors other than students' rate of task completion. Variables such as the quality of tasks designed to teach the instructional objectives being tested, students' previous learning experiences, time available to work on tasks, and the availability of teacher time for administering diagnostic tests are all highly related to the students' rate of test passing (Wang, 1970; Yeager & Lindvall, 1968; Wang & Schuetz, Note 1). Therefore, the results also suggest that as we continue our design work on the Self-Schedule System, systematic evaluation of the learning tasks included in the program and such classroom practices as diagnostic testing, tutoring procedures, and so forth should also be included as components in our subsequent research and development work.

The First-Grade Study

The First-Grade Study was specifically designed to investigate the effects of the Self-Schedule System on the learning and instructional

processes. The goal was to gather formative evaluation information on the design of the Self-Schedule System in the context of implementing the LRDC program in a first-grade setting, and to develop measures and techniques to investigate the classroom learning and instructional processes.

Setting

The study was carried out in one of the four first-grade classrooms of the same school in which the Preschool Study, described earlier, was carried out. The teacher, with her aide's agreement, volunteered to have her class participate in the study. The LRDC individualized instructional programs were used in all four first grades in the school. Each class included two adults, a teacher and an aide. Both the teacher and the aide shared classroom instructional functions dictated by the design of the LRDC program. (See Appendix A.)

Subjects

The teacher and the assistant teacher as well as all the students of their first-grade class served as subjects for the study. The total number of students enrolled in the class was 25. The mean CA of the students during the experimental period was 6 years, 7 months.

Design

The study consisted of an initial baseline period which lasted for four months, a four-month experimental period, and a one-month reversal period. The Block Schedule System was used during the baseline and reversal periods, and the Self-Schedule System was used during the experimental period of the study.

The first-grade curriculum consisted of the LRDC prescriptive learning programs in reading and math, the LRDC exploratory learning

curriculum, and several other subject areas specified by the school district (e.g., music, writing, gym, etc.). During the baseline and the reversal periods, the Block Schedule System was adopted. The students worked on specific curriculum areas during the time periods scheduled by the teacher; when a student completed the assignment before the end of the period, the student was required to work on additional tasks in the same subject area until the time period ended. Those who completed all their work during each of the designated periods received a "happy face" mark for the day. The happy faces were recorded on a weekly summary sheet placed on the wall where students could see at a glance what they and others had done during that week. Students who received a happy face for each day during the week were rewarded with a special activity of their own design. The students designed a variety of activities ranging from asking five minutes of the teacher's time to do whatever they wanted to do with her and emptying waste paper baskets to reading a story to the building supervisors.

During the experimental period, students functioned under the Self-Schedule System. All the conditions remained the same as in the baseline and the reversal periods with only one exception--the elimination of time periods designated for each of the subject areas by the teacher (i.e., reading, math, and exploratory learning periods). During the experimental period, students were expected to complete all the prescriptive tasks assigned to them and two exploratory tasks of their own choice each school day. Therefore, the students in this study, as in the Preschool Study, were given the opportunity and the responsibility for scheduling their daily learning activities.

Measures

In addition to student task completion rates, two observational instruments were designed to assess the effects of the Self-Schedule

System on student as well as teacher classroom behaviors. The Teacher Behavior Observation Schedule (TBOS) was designed to record teacher-student interactions during the instructional process. Information obtained from the TBOS included the frequency of the teacher interactions with students as well as the purposes of the interactions. The Student Behavior Observation Schedule (SBOS) was designed to gather information on student learning processes as well as certain learning outcomes. Therefore, in addition to recording the frequencies and the purposes of student interactions with the teachers and their peers, the SBOS was designed to document the type of student learning activities and the settings in which the activities were carried out. For further descriptions of the observation instruments, see Wang (1974b).

Procedure

Using the SBOS, every student in the class was observed for 15 minutes at a time and a total of 75 minutes during each of the three observational periods, baseline (B_1), experimental (E), and reversal (B_2). A specific observational schedule was established to insure that a 15-minute observation would be made of each student during a different hourly segment of the school day. The school day was divided into 1-hour segments. The 75 minutes of observation for each student spread from 2 to 3 days, and in no case was a given student observed twice within two consecutive hourly segments. Under this stipulation, four different students were observed during each hour. The students were ranked alphabetically to establish the order of the observation sequence. The observer followed the established observation sequence as closely as possible.

The observer focused on one student at a time. A stopwatch was used to time the observation intervals, and a frequency coding method was used to record the observed behaviors. The 15-minute observation of each student was broken down into a minute of observation, during

which the observer coded behaviors listed in the observational schedule followed by a 2-minute period during which the observer completed coding and recorded additional information judged to be relevant. Therefore, the actual observation time during each 15-minute observation period was on minutes 1, 4, 7, 10, and 13, a total of five 3-minute observation intervals. At the end of the 15-minute observation of Student 1, the observer began a 15-minute observation of Student 2, following the same procedure.

An additional 2-1/2 hours of observational data were collected for six students who were selected for intensive study. One girl and one boy were selected from each of the student achievement categories--advanced, average, and below average achievement. The six children were selected on the basis of teacher judgment and their learning progress in prescriptive curricula. To insure adequate sampling of behaviors, a predetermined schedule was again set up to systematically alter the time of the day during which the additional 15-minute observation for each student included in the intensive study sample would be made.

Teacher behaviors were observed using the TBOS. The observer focused on one adult (the teacher or the assistant teacher) at a time. Each was observed 50 minutes of every hour of a full school day. Observation records for three separate days were made for both the teacher and the assistant teacher during B_1 and E. Because of time limits, no systematic observation of teacher behavior during B_2 was made in this study. In general, the inter-observer reliabilities were high with the exception of the categories dealing with peer interactions and determining the purpose of these interactions. The lower reliability in these categories probably resulted from the inability of the observers to get within the close proximity required to determine the purpose of the interaction. (In most cases, the observer was not able to hear clearly the verbal interchange among the children.) The inter-

observer reliability of each category included in the observational schedule is listed in Tables 1 and 2.

In the First-Grade Study, student learning performance was measured by the total number of prescriptive and exploratory tasks completed by each student during each of the three observational cycles (B_1, E, B_2). The performance data was collected by a research assistant at the end of each school day.

Results

Observational data obtained from the SBOS were analyzed under two categories: student learning processes and student interaction patterns. For each of the observational periods, B_1, E, and B_2, the mean ratio of behavior occurrence for each of the behavior subitems included in the SBOS was calculated. The results are reported in Tables 1 and 2. The mean ratio was calculated from the total number of behaviors observed for a given subitem, divided by the total number of minutes of observation time. To test the significance of the differences between the behavior means obtained during the various observational periods, t tests were performed. The t-test results are reported in the last three columns of Tables 1 and 2.

In general, the results indicate that the Self-Schedule System greatly affected the classroom behaviors of the students. As shown in Table 1, students were observed to have engaged less frequently in prescriptive activities during the experimental period (.66) than during the baseline periods (.87 and .75), they initiated more activities during the experimental period (.87) than during the baseline periods (.04 and .31), they were more on task during the experimental period (.81) than during the baseline periods (.57 and .46), and they waited for the teacher less frequently during the experimental period (.08) than during the baseline periods (.25 and .15).

Table 1

Mean Ratio of Behavior Occurrence in the Learning Process of First Grade Students
(N = 25)

Variables	Inter-observer Reliability	Observation Periods: Baseline 1 (Block Schedule) Mean	Baseline 1 (Block Schedule) SD	Experimental (Self Schedule) Mean	Experimental (Self Schedule) SD	Baseline 2 (Block Schedule) Mean	Baseline 2 (Block Schedule) SD	t Tests of the Differences of the Means $E.B_1$	t Tests of the Differences of the Means $E.B_2$	% of significant t's per category**
1. Manner in which activities are initiated:										
a. Assigned	1.00	.94	.07	.12	.12	.64	.15	*	*	
b. Invitation by another student	1.00	.00		.00		.02	.13			
c. Self-initiated	.85	.04	.01	.87	.21	.31	.14	*	*	
d. Not sure	.98	.00		.01	.07	.03	.16			50%
2. Manner in which activities are carried out:										
a. Distracted	.94	.19	.23	.13	.24	.40	.35	*	*	
b. On task	.92	.57	.16	.81	.09	.46	.15	*	*	
c. Waiting	.96	.25	.19	.08	.05	.15	.14	*		83%
3. Activity types:										
a. Prescriptive	1.00	.87	.16	.66	.12	.75	.20	*	*	
b. Exploratory	1.00	.05	.06	.31	.12	.09	.12	*	*	100%
4. Setting:										
a. Group parallel	.96	.01	.03	.15	.16	.12	.30	*		
b. Group interactive	.60	.04	.09	.09	.24	.05	.20			
c. Individual	.98	.93	.12	.76	.36	.78	.39	*		33%

Note. Mean ratio of behavior occurrence = $\frac{\text{number of behavior occurrences}}{\text{number of minutes of observation}}$

* t Test significant at and beyond the .05 level.

** Expected statistically significant t's by chance is 5%.

Table 2

First Grade Student Interaction Patterns as Reflected in the Ratio of Behavior Occurrence
(N = 25)

Variables	Inter Observer Reliability	Observation Periods: Baseline 1 (Block Schedule) Mean	Baseline 1 (Block Schedule) *SD*	Experimental (Self Schedule) Mean	Experimental (Self Schedule) *SD*	Baseline 2 (Block Schedule) Mean	Baseline 2 (Block Schedule) *SD*	*t* Test of the Differences of the Means $E.B_1$	*t* Test of the Differences of the Means $E.B_2$	% of significant *t*'s per category **
Interaction with teacher:	.88	.25	.19	.15	.28	.18	.21			
1. Type:										
a. Student-initiated	.93	.14	.12	.09	.03	.08	.09	*		
b. Teacher-initiated	.87	.10	.08	.06	.02	.11	.08	*	*	
2. Purpose:	.87									
a. Management	.97	.08	.11	.05	.11	.08	.16			
b. Instructional	.89	.19	.14	.14	.10	.12	.15			
c. Personal	.82	.12	.11	.09	.05	.05	.04			25%
Interaction with peers:	.88	.60	.37	.50	.32	.60	.38			
1. Type:										
a. Student-initiated	.94	.33	.15	.24	.08	.25	.16	*		
b. Initiated by another student	.87	.33	.20	.26	.08	.34	.17		*	
2. Purpose:										
a. Sharing	.68	.23	.13	.29	.10	.24	.18			
b. Disagreement	.68	.09	.14	.02	.07	.09	.16	*	*	
c. Conversation	.66	.37	.07	.24	.11	.31	.16			30%

Note. Mean ratio of behavior occurrence = $\frac{\text{number of behavior occurrences}}{\text{number of minutes of observation}}$

* *t* Test significant at and beyond the .05 level.

** Expected statistically significant *t*'s by chance is 5%.

Patterns of student classroom interactions reported in Table 2 also suggest that students, in general, behaved more similarly during the two baseline periods than they did during the experimental period. For example, students interacted less with teachers (.15) and peers (.50) during the experimental period than their interaction with teachers (.25 and .18) and peers (.60 and .60) during the two baseline periods. They also exhibited more "disagreement" behaviors during the two baseline periods (.09 and .09) than during the experimental period (.02). Figures 1 and 2 graphically show the changes of student behavior in a selected number of behavior categories.

The effects of the Self-Schedule System on the individual students were further examined using the observational data collected on the six students chosen for intensive study. The learning characteristics of the students are summarized in Table 3.

Table 3 summarizes the behavior changes of a selected number of behavior variables and the rate of task completion of each student during each observation period. Although the data on individual students suggest that the Self-Schedule System affected students differentially, one can clearly detect that a general group trend prevailed in the patterns of individual behavior changes between periods. The behavior patterns shown in Table 3, for example, indicate that with the exception of Student 5, students consistently spent less time in prescriptive activities and yet they completed more prescriptive tasks during E. Students, in general, exhibited fewer disagreement behaviors during E in comparison to the B periods.

Effects of the Self-Schedule System on teacher classroom behaviors are summarized in Table 4. Significant changes in teacher behaviors were found in three categories. In comparison to the baseline period, the teachers engaged significantly more in individual instructions (.62) during the experimental period, and they interacted significantly more with the individual students for instructional activities (2.13) and

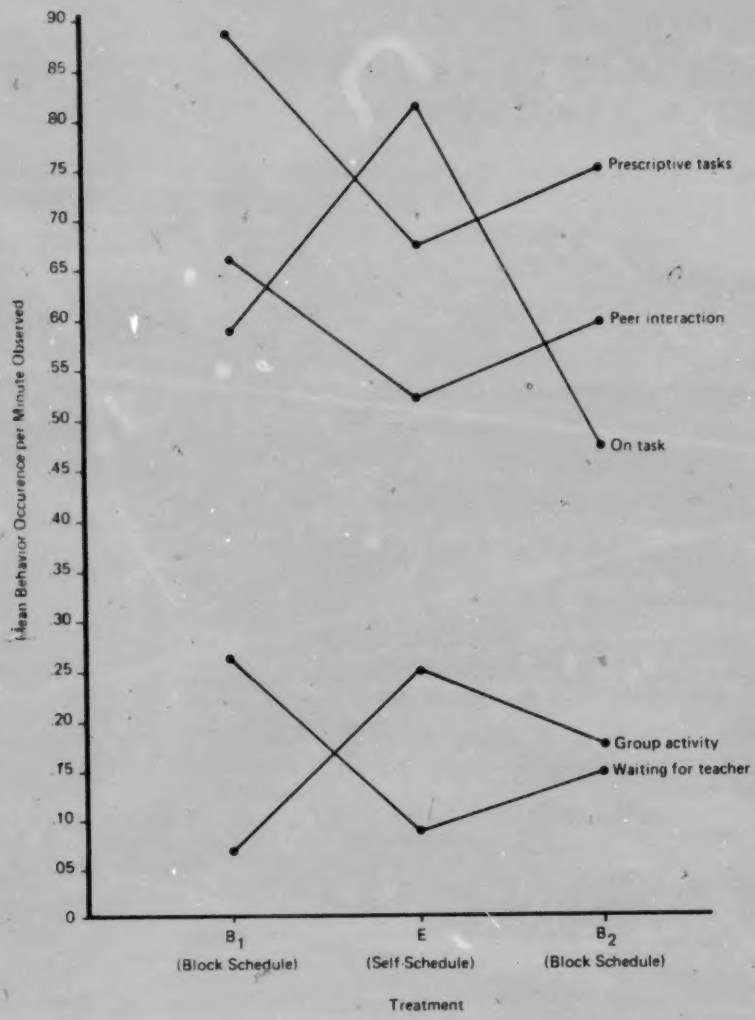

Figure 1. Changes in first-grade student behavior patterns in selected categories.

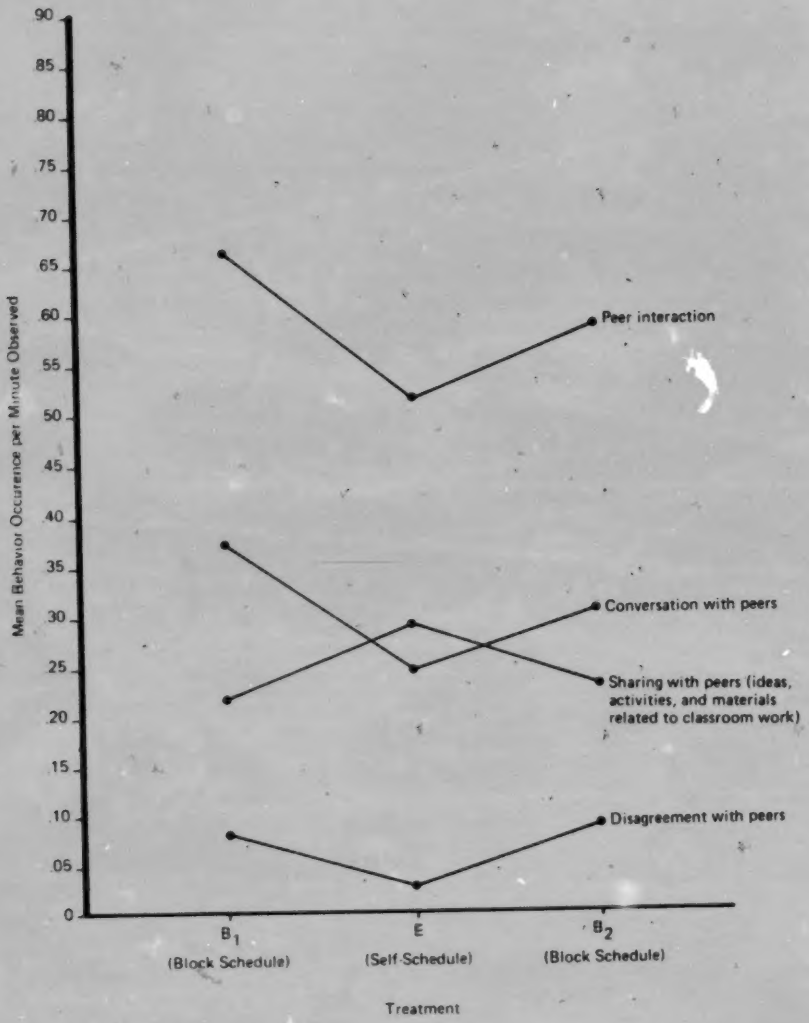

Figure 2 Changes in types of first-grade peer interaction.

Table 3

Mean Ratio of Student Behavior and Task Completion Rate of Six First Grade Students

Variables	Student 1			Student 2			Student 3			Student 4			Student 5			Student 6		
	B_1	E	B_2	B_1	E	B_2	B_1	E	B_2	B_1	E	B_2	B_1	E	B_2	B_1	E	B_2
1 Activity type																		
a Prescriptive	67	79	83	1 00	65	90	80	58	75	50	75	71	1.00	44	79	1 00	76	69
b Exploratory	00	18	10	00	31	20	05	27	13	25	17	21	00	55	10	00	10	31
c Assigned	1 00	01	76	1 00	13	79	1 00	13	75	75	10	75	1 00	00	79	1 00	12	69
d Self-initiated	00	97	24	00	87	10	00	80	25	25	80	13	00	95	21	00	86	31
2 Manner																		
a Purposeful	80	62	48	80	80	59	52	45	54	85	78	67	1 00	98	76	1 00	58	59
b Waiting	27	07	10	00	33	11	25	08	15	05	08	04	10	00	28	00	14	21
3 Interaction with teacher																		
a Student-initiated	13	06	00	20	40	17	14	07	08	05	06	04	30	06	10	1 00	14	03
b Teacher-initiated	13	07	03	20	06	07	10	29	17	05	22	04	10	05	03	00	13	14
4 Interaction with peers																		
a Disagreement	13	03	07	30	01	07	30	25	08	15	04	25	10	03	00	10	40	38
b Conversation	60	45	31	10	21	34	59	49	75	80	16	29	20	05	00	00	02	07
5 Task completion rate																		
a Prescriptive	8 49	25 25	12 50	18 66	42 45	23 13	8 00	19 11	12 50	15 80	39 20	13 60	13 00	24 77	28 25	16 17	28 07	17 00
b Exploratory	42	1 25	38	4 33	2 91	2 25	5 66	2 62	1 75	1 66	1 51	1 50	5 50	6 90	4 75	4 66	4 34	3 50

significantly less with students for management purposes (.25). The overall results seem to suggest that the Self-Schedule System seems to be a more effective instructional "support" system to the extent that it enables the teacher to interact with students more on instructional matters.

Table 4

Mean Ratio of First-Grade Teacher Classroom Behaviors

Activity	Baseline (B_1) (Block Schedule)	Experimental (E) (Self Schedule)	t Test
1. Instructional activities:			
a. Individualized	40	62	< .01
b. Small group	07	09	> 05
c. Large group	12	12	> 05
2. Management activities:	16	13	> .05
3. Types of interaction with students:			
a. Instructional	1 48	2 13	< .05
b. Management	44	25	< .05

Discussion

Findings from the First-Grade Study have contributed to a great extent to our understanding of student behavior characteristics and learning outcomes under the Self-Schedule System. The results not only supported the general findings from the Preschool Study, but they also provided clearer empirical evidence regarding the positive effects of the Self-Schedule System on the classroom behaviors of the teacher and the students.

The results indicate that, under the Self-Schedule System, students consistently accomplished more in school in less time, they worked in groups more frequently, they engaged more in self-initiated activities, they exhibited more purposeful behavior, and they spent less time waiting for assistance from the teachers. Furthermore, the individual differences in the behavior patterns of the six individual students included in the intensive sample suggest that the Self-Schedule System may have provided more flexibility in the learning environment in adapting to individual differences in students.

In addition to the behavioral changes shown in our data, a change in students' perceptions of their self-responsibility for learning and their motivation for learning was informally noted. Students functioning under the Self-Schedule System appeared to be more in control of their learning environment and, more importantly, they seemed to want to complete what they had planned to do and enjoyed what they were expected to do in school. These informal observations of changes in the students' perception of self-responsibility in school learning and their ability to exert increasing control over what they do in school suggest that these are some of the important outcomes of the Self-Schedule System and they should become the focus of our future investigations in this area.

The Second-Grade Study

Setting

The study was carried out in one of the four second-grade classrooms of the same inner-city public elementary school in which the First-Grade Study and the Preschool Study reported in this paper were conducted. Again, the class which served as the experimental class for the present study was volunteered by the teacher and her aide. The LRDC individualized instructional programs were used in all four second-grade classes in the school.

Subjects

The teacher, the aide, and all the students enrolled in their second-grade class served as experimental subjects for the study. The students enrolled in the other three second-grade classes from the same inner-city school served as comparison Group A of the study. The students from two second-grade classes of the LRDC developmental school located in a suburban school district south of Pittsburgh served as comparison Group B of the study. Students from this school generally come from white, working-class families.

In each school, students were assigned randomly to the different second-grade classes at the beginning of the school year. The experimental class consisted of 21 students. The mean CA for the experimental class at the time the study began was 7 years, 7 months--ranging from 7 years to 8 years, 7 months. There were 11 boys and 10 girls.

Comparison Group A consisted of 64 students. The mean CA for the group was 7 years, 8 months at the beginning of the study. The range was 7 years to 9 years, 2 months. There were 34 boys and 30 girls. Comparison Group B consisted of 49 second graders. There were 23 boys and 26 girls and their mean CA was 7 years, 5 months, ranging from 7 years to 8 years, 4 months.

Design

The comparison groups adopted the Block Schedule System throughout the present study. A modified repeated measure design (A-B-A-B) was used to investigate the effects of the Self-Schedule System in the experimental classroom. The Block Schedule System was used by the experimental class during the two baseline periods (B_1 and B_2) and the Self-Schedule System was adopted during the two experimental periods (E_1 and E_2). Five weeks of school time were devoted to each of the four periods in the order of B_1, E_1, B_2, and E_2.

Under the Block Schedule System, the school day for the second grades was organized as in the studies previously described in this paper. The day was broken into block periods for the LRDC individualized reading program, the LRDC individualized math program, group learning (curriculum areas specified and designed by the school district, e.g., spelling social studies, music, gym, etc.), and the LRDC exploratory learning program. During the baseline periods, students were required to engage in learning activities for a given subject area at the time specifically scheduled for that subject area. Students who completed their assignments prior to the end of the period scheduled for a given subject area were given either additional assignments in that subject area or some seat work to occupy their time until the end of the period.

During the experimental periods, when the students from the experimental group were functioning under the Self-Schedule System, they received the same amount of daily assignments for each subject (e.g., math), as well as the same amount of total time for working on the assignments as they did during the baseline period. However, no specific time block was designated for working on tasks of any given subject area. The students could work on learning tasks prescribed by the teacher in any of the subject areas or work on exploratory learning tasks of their own choice at any time during the day, except during group lessons involving the entire class (e.g., physical education).

The conditions during the two baseline periods for the experimental class were identical, as were conditions during the two experimental periods except for one variable. During E_1, students were given the responsibility for deciding when to do what as long as they completed all the "expected" amount of work from the previous day. The expected amount of work for any given student per day included several tasks in reading and math prescribed by the teacher and two student-selected exploratory learning activities. Those students who

did not complete the expected amount of work for a given day were not permitted to schedule their activity sequences on the following day. They had to work according to a schedule given by the teacher. The teacher generally required the students to complete all the prescribed tasks first before they were allowed to work on exploratory tasks of their own choice. During E_2, all the students could decide what to do first, even if they had not completed all the expected amount of work during the previous day. Teachers discussed the work performance with the students and verbally reinforced the students for completing the expected work as in B_1, B_2, and E_1, but never took away the students' privileges to schedule their own activities during E_2 as they did during E_1.

Measures

In addition to the observational measures and the student learning performance measures used in the First-Grade Study, two measures designed to investigate the effects of the Self-Schedule System on the development of the students' perceptions of self-responsibility for school learning were included in the Second-Grade Study. A brief description of the measures used in this study follow:

1. The measure of self-responsibility for school learning. The Self-Responsibility Interview Schedule (SRIS) was designed to assess students' perceptions of self-responsibility for school learning (Wang, Note 2). It was constructed to assess students' knowledge about what they do in school and to determine whether they perceive that they, rather than the teacher, are responsible for managing their own learning. The term "self-responsibility for one's school learning" for the present study is defined as the ability to: (a) make decisions about when to do what in school; (b) choose activities and make learning plans which include the teacher-prescribed learning activities (specified by the teacher based on diagnostic test results); (c) structure one's learning

plans and environment for carrying out the learning plans; and (d) recognize that the tasks included in one's learning plans must be completed within the specified amount of time (e.g., an hour, a day, a week, etc.).

Specifically, the SRIS included 20 questions designed to obtain information about the students' knowledge about their learning in school, sense of control over the school learning environment, ability to evaluate their own learning, and whether the student preferred to operate under a mangement system which requires that they be responsible for what and how they learn in school, or under a management system that places the responsibility of planning for student learning solely on the teacher. The test-retest reliability coefficient for the SRIS was .59, obtained from two sets of SRIS scores of 40 students given two weeks apart. The percent of interrater agreement of the scoring of SRIS was 98%.

2. The measure of student perception of intellectual achievement responsibility. The Intellectual Achievement Responsibility (IAR) Questionnaire designed by Crandall, Katkovsky, and Crandall (1965) was administered to obtain additional information about students' perception of the locus of control for their intellectual and school achievements. The IAR consists of 34 forced-choice items. Each item describes either a positive or a negative achievement experience which routinely occurs in children's daily lives.

3. The measure of student task performance. Weekly task completion rates (tasks completed correctly per week) were calculated to assess the learning performance of each student enrolled in the experimental class during each of the four periods. The rates were calculated as ratios of the number of assignments completed to the number of assignments prescribed per week.

4. Observation measures. The TBOS and the SBOS used in the

First-Grade Study described previously were used for the present study to collect data on teacher and student classroom behavior.

Procedure

Observation of classroom behaviors. Classroom behaviors of students enrolled in the experimental classroom were observed during each of the four periods (B_1, E_1, B_2, and E_2) of the study. Using the SBOS, every student in the experimental class was observed for three 1-minute intervals at a time and a total of 18 minutes of observation was made for each student during each of the four periods. A predetermined observational schedule was set up to insure that three 1-minute observation intervals out of each different hourly segment of the school day were made for each student. However, no observation was carried out during group lessons such as music, gym, spelling, etc. Observational procedures used were identical to the procedures described in the First-Grade Study reported in a previous section of the paper.

Teacher behavior was also observed using the TBOS during each of the four periods (B_1, E_1, B_2, and E_2). Each teacher was observed for a total of 40 1-minute intervals during each period. A predetermined observation schedule was set up to insure that each teacher was observed for five 1-minute intervals during each hourly segment of the school day. All the observations were conducted by a trained research assistant. An inter-observer reliability was obtained during the beginning of each observational period for B_1, E_1, B_2, and E_2. The percents of agreement were 85%, 92%, 94%, and 95%, respectively.

Student interviews. The SRIS was administered during the third week of periods E_1, B_2, and E_2 to students in the experimental group and during the fourth week of B_2 and E_2 to the comparison groups. All of the SRIS interviews were conducted by a trained research assistant.

The interviews were administered orally and individually in a space outside of the classroom and away from distractions. Student responses to each item were recorded verbatim on the interview form. The SRIS interview took approximately 10 minutes to administer per student.

The IAR was administered to all the students at the end of E_2. It was administered orally and individually in an area specifically designated for this purpose. Two research assistants administered the IAR to the students in both schools. They used a cassette recorder and a prerecorded cassette tape of the IAR questions. The recorder was equipped for automatic stopping. The tape stopped after each question; after the student responded to the question, the interviewer pressed the start button on the recorder for the next question. The student was asked to respond to each question verbally after each stop and the interviewer marked each response accordingly on a separate answer sheet for each student. The questions were repeated verbatim by the interviewer when necessary; however, in no case was the question rephrased for the student. In administering the IAR, the interviewers were instructed explicitly to follow the procedures specified by the authors of the IAR.

Student learning performance. Task completion rates for each of the students were collected on a daily basis. Task completion rates were calculated as a ratio of the total number of tasks completed to the total number of tasks assigned per day.

To provide the readers with a clearer picture of when the various measures were obtained for the present study, Table 5 gives a summary of the scheduling and the type of measures used during each of the periods.

Table 5

Summary of Periods in Which the Measures Were Obtained in Second-Grade Classrooms

Periods	Measures						
	SRIS		IAR		Task Completion Rate	SBOS	TBOS
	Experimental Group	Comparison Group	Experimental Group	Comparison Group	Experimental Group	Experimental Group	Experimental Group
Baseline 1					X	X	X
Experimental 1	X				X	X	X
Baseline 2	X	X			X	X	X
Experimental 2	X	X	X	X	X	X	X

Results

Classroom behaviors. Table 6 summarizes the observation data collected on student learning processes, as well as some learning outcome variables. Included in Table 6 are categories of behaviors observed, mean ratios of behavior occurrence, standard deviations for each of the four periods, as well as the results of the t tests performed to test the statistical significance of the differences of the means for each category of behavior between each combination of two periods.

Results obtained from the classroom observations of student behaviors were consistent with findings from the First-Grade Study. Because of the A-B-A-B design employed in the Second-Grade Study, the results were even more convincing that the Self-Schedule System was instrumental in altering certain classroom behaviors of the students. For example, under the first category heading listed in Table 6--manner in which activities are carried out--the results indicate that on-task behavior of the students changed from .77 to .82 from B_1 to E_1, dropped to .71 from E_1 to B_2, and increased to .84 from B_2 to E_2. The t-test results indicate that the differences between B_2 and E_2 were statistically significant.

In general, the results indicate that student behaviors changed as the instructional-learning management systems were changed from period to period. As indicated by the t-test results, statistically significant differences in student behaviors were generally found between the baseline and the experimental periods, while the behavior changes between the two baseline periods and the two experimental periods were not found to be statistically significant. Figure 3 shows certain prominent patterns of student behavior changes. Students were more on task, less distracted, spent less time waiting, and interacted with the teacher less for management purposes.

Table 6

Mean Ratio of Behavior Occurrence in the Learning Process of Second-Grade Students

Variables	Observational Periods								t Score of Mean Differences			
	B_{11}		E_1		B_2		E_2		Periods			
	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*	B_1E_1	B_2E_2	B_1B_2	E_1E_2
1 Manner in which activities are carried out												
a On task	77	42	82	39	71	45	84	37	1.51	2.70*	1.09	.39
b Waiting for teacher's help	08	28	06	24	10	31	06	23	.42	1.80	1.07	.34
c Distracted	13	34	10	03	16	36	10	30	1.56	1.53	.34	11
2 Activity types												
a Prescriptive	70	46	80	40	68	47	69	46	2.54*	.73	1.05	2.26*
b Exploratory	30	46	19	39	31	46	31	46	.06	.90	.03	2.32
3 Setting												
a Group parallel	08	27	03	16	14	34	03	18	1.18	.60	.24	1.64
b Group interactive	05	23	08	28	06	23	04	20	2.11*	3.38**	1.40	.21
c Individual	87	33	87	33	78	41	93	25	.18	3.98**	2.18*	1.80
4 Manner in which activities are initiated												
a Assigned	73	44	01	07	72	45	01	11	35.55**	25.09**	.35	1.38
b Self-initiated	26	44	97	17	25	43	98	15	29.98**	23.69**	.14	.19
5 Student interactions with teacher												
a Management interactions	03	19	01	10	04	23	02	13	1.47	2.53*	.33	.61
b Instructional interactions	14	39	09	24	09	30	05	24	2.07*	3.28**	1.87	2.35*

Note Mean ratio of behavior occurrence = $\frac{\text{number of behavior occurrences}}{\text{number of minutes of observations}}$

* $p < .05$

** $p < .01$

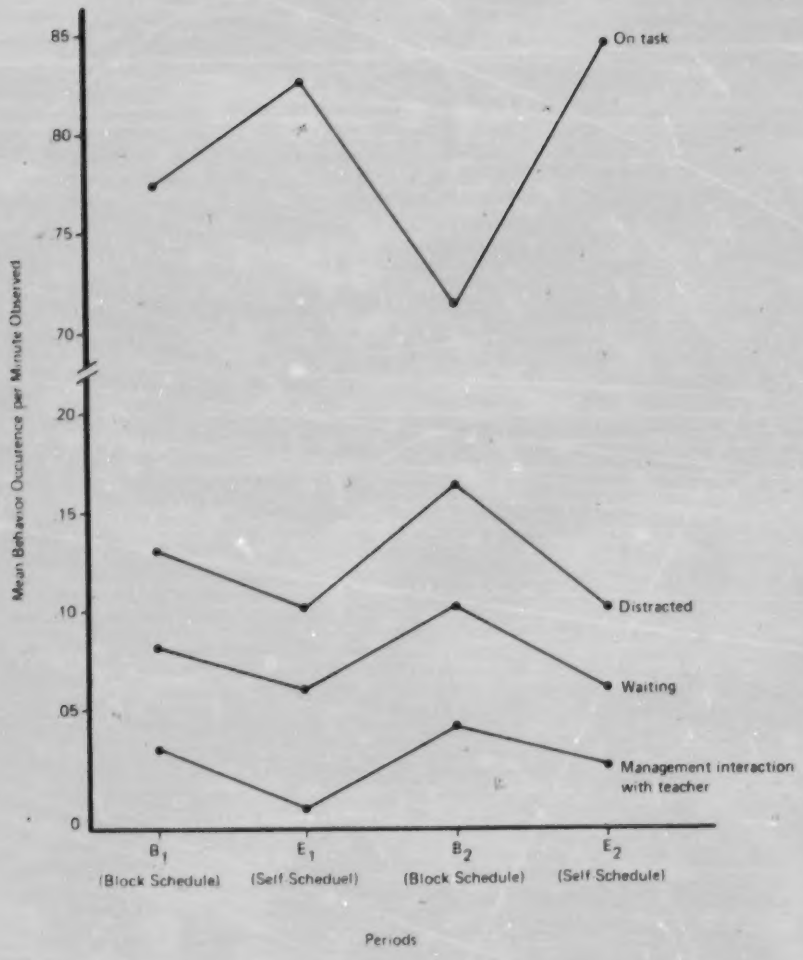

Figure 3. Changes in second-grade student behavior patterns in selected categories.

Observation data on teacher classroom behavior also supported our hypothesis about the effect of the Self-Schedule System. Teachers interacted with students less on management matters (this result is also consistent with the observation data on students), spent more time on small group interactions (i.e., tutoring), and less time on short instructional interactions. Figure 4 shows the patterns of teacher behavior changes in a selected number of behavior categories.

Student learning performance. Figure 5 indicates the changes in student learning performance as measured by the student rate of task completion during each period. The mean rate of task completion during B_1 was 54.86 and increased to 64.57 during E_1 ($p < .05$), decreased to 51.62 during B_2 ($p < .01$), and increased to 73.52 during E_2 ($p < .01$).

To investigate the differential effects of the system on the learning performance of individual students, we examined the learning performance of a boy and a girl randomly selected from three different achievement groups (high, average, and low). Figure 6 shows the task completion rate of two students selected from the low-achievement group. Information on each student's level of mastery in the math and reading curricula at the end of the school year, as well as their end-of-year Wide Range Achievement Test (Jastak, Bijou, & Jastak, 1965) scores, are also reported in the figure. As shown on Figure 6, both Student 1 and 2 consistently completed more tasks under the Self-Schedule System than they did under the Block Schedule System. Figure 7 shows the results of two students selected from students of average achievement, and Figure 8 shows the results of two students from the high-achievement group. Again, the same pattern of task completion rates were found. Students in the average and the high group also completed more tasks during E_1 and E_2.

Students' perception of self-responsibility. In this series of analyses performed on the data collected from the SRIS and the IAR, we were particularly interested in learning: (a) whether the SRIS

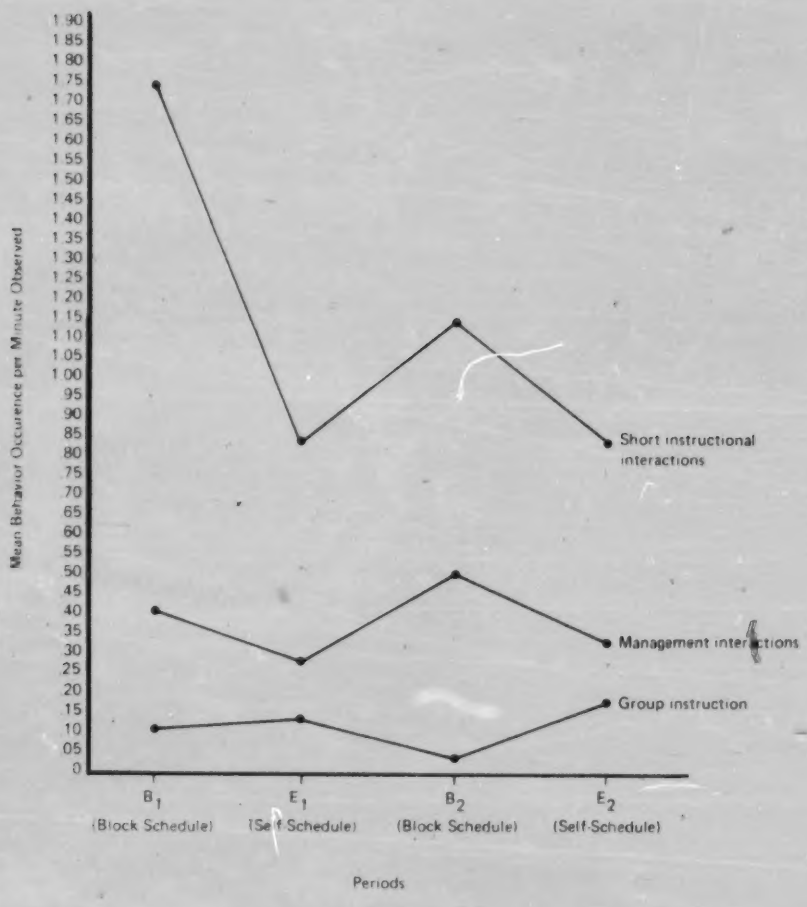

Figure 4. Changes in second grade teacher behavior patterns in selected categories

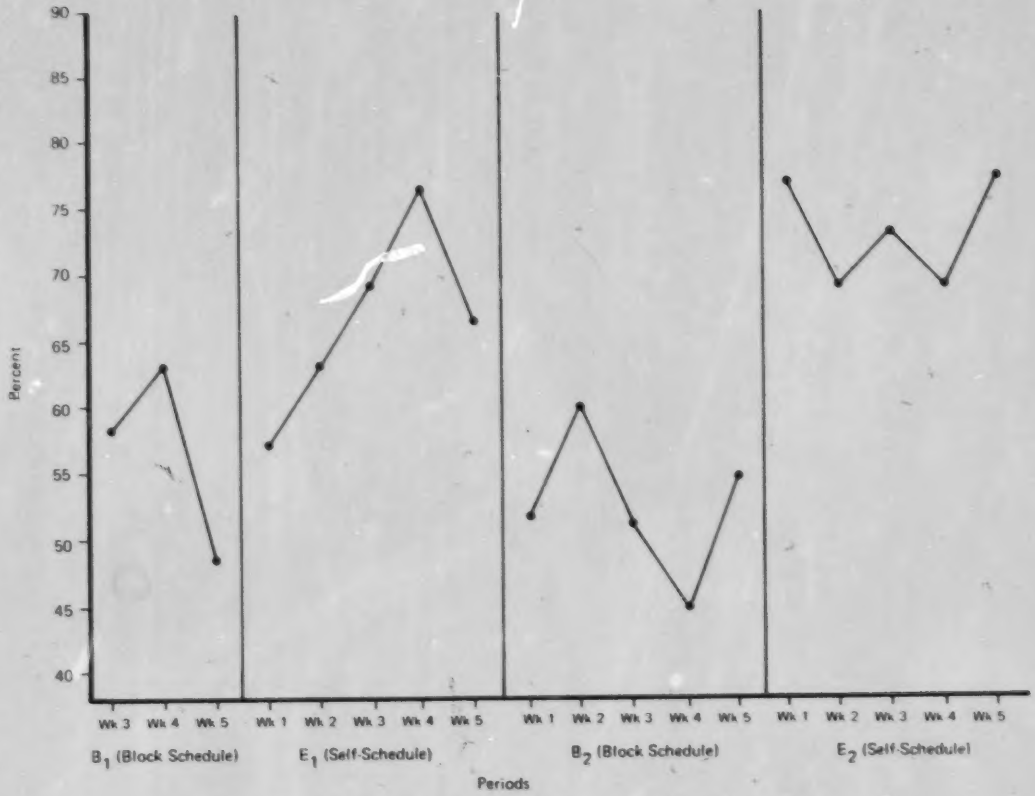

Figure 5. Mean percent of assignment completion by the total second-grade class per week.

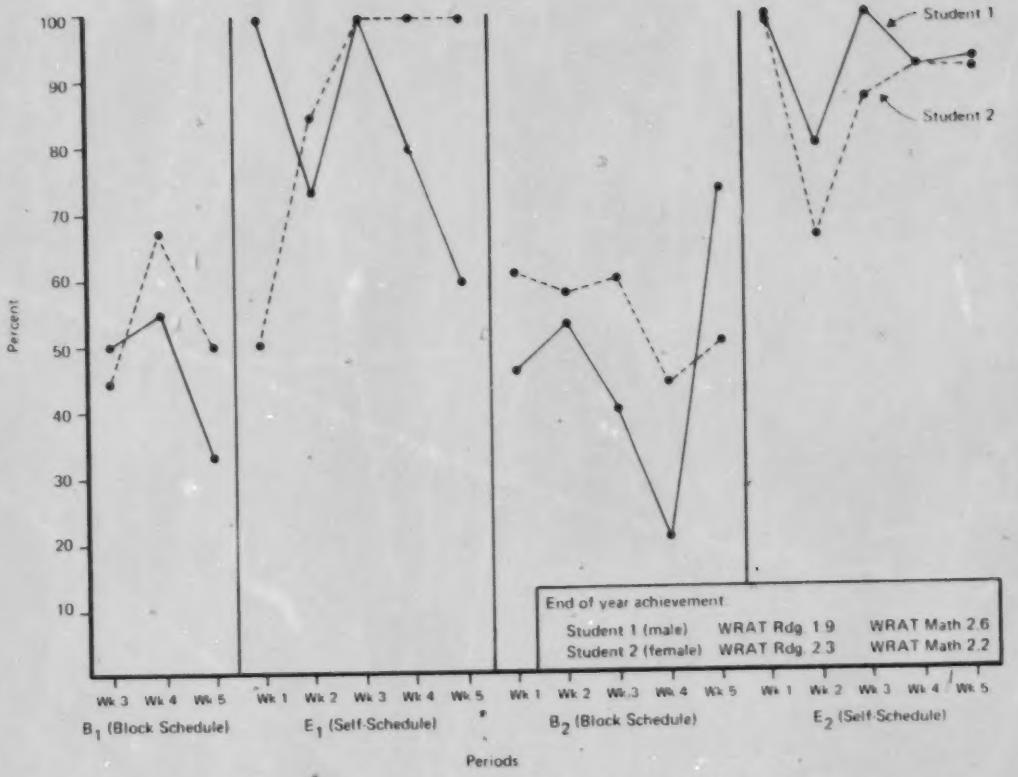

Figure 6. Mean percent of assignment completion per week for two second-grade students selected from the low-achievement group.

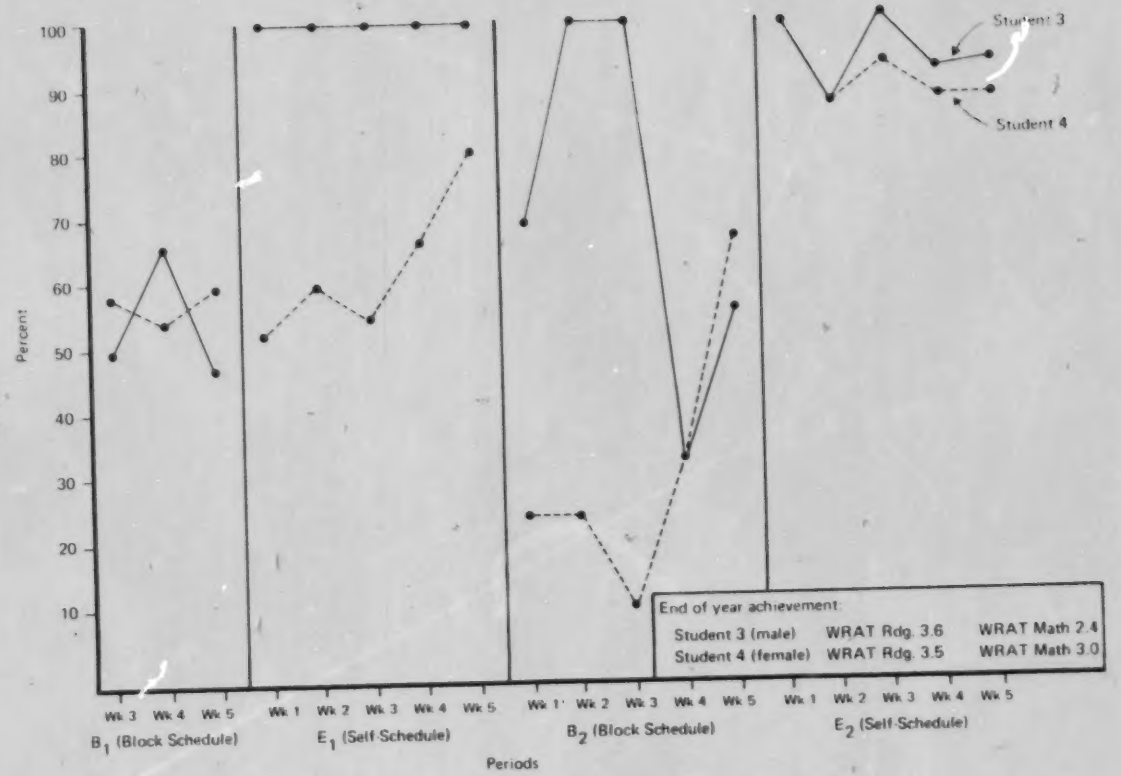

Figure 7. Mean percent of assignment completion per week for two second-grade students selected from the average-achievement group.

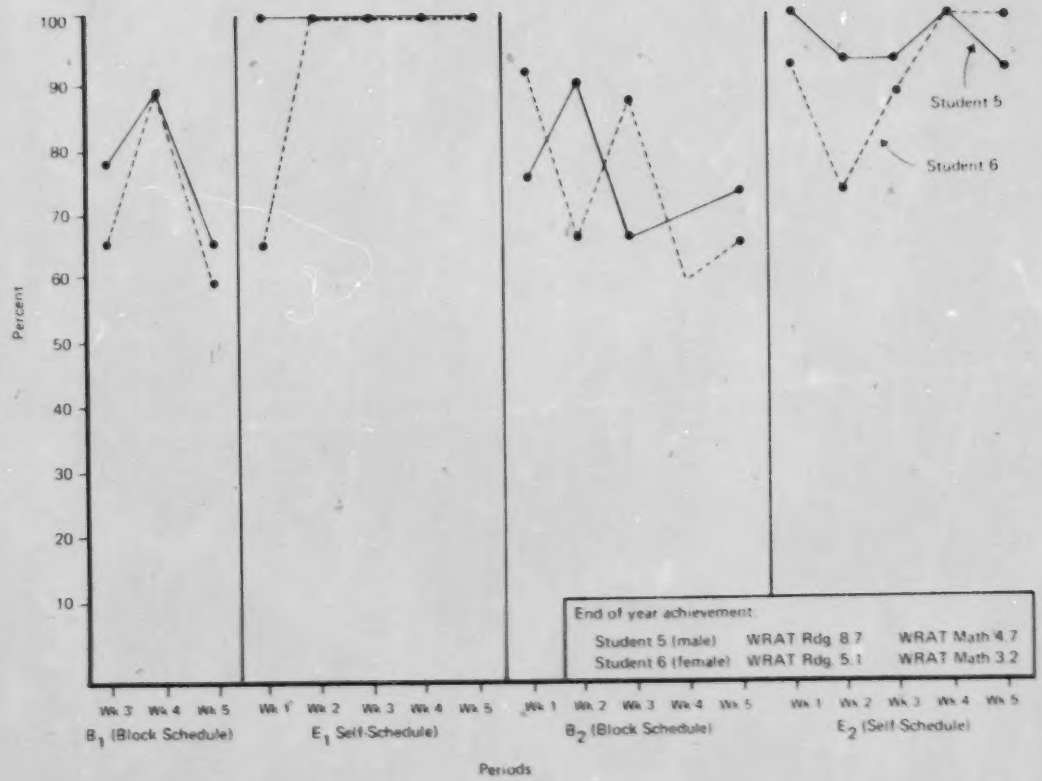

Figure 8. Mean percent of assignment completion per week for two second-grade students selected from the high achievement group.

scores and the task completion rates of students in the Self-Schedule group changed significantly between the baseline and the experimental periods, (b) whether the SRIS scores between the experimental group and the comparison groups differed significantly during the baseline and during the experimental periods, and (c) whether the IAR scores of the experimental group differed significantly from those of the comparison groups.

Table 7 shows the means and standard deviations of the SRIS and the IAR scores for each of the periods and Table 8 reports the results of the t tests of the differences of the means. As expected, the SRIS scores for the experimental group were significantly higher than the SRIS scores of the comparison groups, and the experimental students scored higher on the SRIS during the self-scheduling period than when they were under the block scheduling period.

A small difference was found in the IAR scores between the experimental and the comparison groups; however, the differences were not statistically significant. The mean IAR scores for the experimental group was 21.10 with a standard deviation of 2.83, while the mean for the comparison groups was 20.13, with a standard deviation of 6.58. The fact that the IAR scores of the experimental group were significantly higher than comparison Group A (comparison Group A came from the same school as the experimental group), but not when compared with the comparison Group B (comparison Group B consisted of students from a different school which differs in a number of student characteristics), seems to suggest that the IAR scores probably reflected some student characteristics other than what we have assumed the IAR actually measures.

Multivariate analysis of variance procedures (MANOVA) designed by Cooley and Lohnes (1971) were used to further investigate the mean differences of the SRIS measures between groups and between periods of the experimental group. A statistically significant main effect,

Table 7

Summary of Second Grade SRIS and IAR Scores

Periods	Experimental Group			Comparison Group A			Comparison Group B			Comparison Groups A & B		
	N	Means	*SD*	*N*	Means	*SD*	*N*	Means	*SD*	*N*	Means	*SD*
SRIS Scores												
Experimental 1*	21	17.09	2.09									
Baseline 2	21	13.89	2.02	59	13.10	1.80	46	12.93	2.25	105	13.03	2.00
Experimental 2	21	16.00	1.95	54	13.27	3.67	42	13.09	2.72	96	13.27	3.29
IAR Scores												
Experimental 2	21	21.10	2.83	49	19.22	6.32	41	23.90	5.25	90	20.13	6.58

* SRIS was not administered to the Comparison Groups during E_1

Table 8

t Test Comparisons of the Differences in the Second-Grade SRIS and IAR Mean Scores

Comparison	*t* Score	Degrees of Freedom	Significance Level
I. SRIS Scores			
A. Experimental Group			
1. Experimental period 1 and baseline period 2	4.63	18	$P < .01$
2. Experimental period 2 and baseline period 2	5.33	18	$P < .01$
3. Experimental period 1 and experimental period 2	1.02	18	———
B. Experimental and Comparison Groups			
1. Baseline period:			
a. Experimental group and comparison group A	0.54	76	———
b. Experimental group and comparison group B	1.61	63	———
c. Experimental group and comparison groups A + B	1.73	122	———
2. Experimental period:			
a. Experimental group and comparison group A	4.12	70	$P < .01$
b. Experimental group and comparison group B	5.36	60	$P < .01$
c. Experimental group and comparison groups A + B	4.83	111	$P < .01$
II. IAR Scores (E_2)			
A. Experimental group vs. comparison group A	2.27	68	$P < .05$
B. Experimental group vs. comparison group B	-3.21	67	$P < .01$
C. Experimental group vs. comparison groups A & B	-0.38	109	———

$F(2, 58) = 8.01$ ($p < .01$), was found in the results of MANOVA of the SRIS scores of the experimental group for periods E_1, B_2, and E_2. A statistically significant main effect was also found, $F(2, 108) = 16.55$ ($p < .01$), in the MANOVA of the SRIS scores of the comparison and the experimental groups during B_2 and E_2. These results suggest that the Self-Schedule System significantly affected the students' perception of self-responsibility. The experimental group not only had significantly higher SRIS scores under the Self-Schedule System, but their SRIS scores were significantly higher when compared to the comparison groups. Table 9 summarizes the comparison results.

The first column of Table 9 indicates the variables included in each comparison, the second and the third columns show the mean and the standard deviation (SD) of the first set of data being compared, and the fourth and fifth columns show the mean and SD of the second data set. The last four columns of Table 9 report the degrees of freedom for each comparison, the univariate F ratio, and probability.

The first series of comparisons listed under Section A of Table 9 were concerned with the differences found in the SRIS scores of the experimental group between periods E_1, B_2, and E_2. The results indicated that students' SRIS responses differed significantly between the second baseline period and the two experimental periods, while the differences in the SRIS responses for the two experimental periods were not found to be statistically significant.

The summary of univariate F ratios between the experimental group and the comparison groups on the SRIS scores for E_2 and B_2 are reported in Section B of Table 9. As indicated by the F ratios, the SRIS responses of the experimental group did not differ significantly from those of the comparison groups during baseline when the Self-Schedule System was not implemented, while the differences in the SRIS between the experimental and the comparison groups were statistically significant during the experimental period. These

Table 9

Comparison of Second Grade SRIS Responses

Comparisons	Data Set		Data Set		ndf_1	ndf_2	*F* Ratio	p^b
	Mean	*SD*	Mean	*SD*				
A. Responses from the Experimental Group								
1. Baseline period 2 and experimental period 1	15.26	2.49	17.10	2.00	1	38	6.64	< .05
2. Baseline period 2 and experimental period 2	15.26	2.49	17.62	2.31	1	38	9.62	< .02
3. Experimental period 1 and experimental period 2	17.10	2.00	17.62	2.31	1	40	.62	—
B. Responses from Experimental and Comparison Groups[a]								
1. Baseline period:								
a. Experimental group and comparison group A	13.89	2.02	13.12	1.82	1	74	2.42	—
b. Experimental group and comparison group B	13.89	2.02	12.93	2.25	1	63	2.58	—
c. Experimental group and comparison groups A + B	13.89	2.02	13.03	2.02	1	122	3.00	—
2. Experimental Period:								
a. Experimental group and comparisqn group A	16.00	1.95	13.11	4.04	1	76	9.86	< .01
b. Experimental group and comparison group B	16.00	1.95	13.05	2.72	1	61	19.59	< .01
c. Experimental group and comparison groups A + B	16.00	1.95	13.08	3.53	1	118	13.45	< .01

[a] Two items from SRIS were deleted from the SRIS interviews for the comparison groups because they are questions pertaining to the Self-Schedule System only. These items were also deleted from the data set of the experimental group when comparisons were made between the SRIS scores of the experimental group and the comparison groups.

[b] Scheffe' posterior test.

results further supported our hypothesis that the system significantly affects the second graders' perception of their self-responsibility as measured by SRIS.

Interrelationships among measures of student learning processes, learning performance, and their perception of self-responsibility. To investigate the relationships among the measures obtained for the present study, a correlation analysis was performed. Table 10 summarizes the intercorrelations among the scores of a selected number of variables obtained from our observations, student task completion rates, and the SRIS and the IAR scores.

Some significant relationships among the measures were found. The results indicate, for example, that the task completion rates are significantly related to the SRIS scores ($p < .05$), suggesting that the students' concept of self-responsibility is significantly related to task completion rates. It is of interest to note that certain significant relationships were also found between some process variables and outcomes. Task completion rate, for example, is negatively correlated with distracted behavior ($p < .01$), and on-task behavior is negatively related to student waiting behavior ($p < .01$) and distracted behavior ($p < .01$).

The intercorrelations among the variables, to some extent, supported our hypotheses about the relationships that exist between the student's classroom behaviors and such learning outcomes as task completion rates, and the student's ability to focus attention to the task at hand. We suspect that more significant correlations between the process variables and outcomes would be found if we had a larger number of students in our analyses.

Discussion

In the Second-Grade Study, we were interested in learning the effects of the Self-Schedule System on the student and the teacher

Table 10

Summary of Correlation Results for Selected Variables in Second Grade Classrooms
($N = 21$)

	Task Completion Rate	SRIS	IAR	Management Interactions with Teacher	On Task	Waiting	Distracted	Instructional Interactions with Teacher
Task completion rate	1.00	.51*	.11	.06	.40	.04	.55**	.21
SRIS		1.00	.36	.09	.30	.23	.17	.04
IAR			1.00	.03	.15	.00	.02	.01
Management interactions with teacher				1.00	.10	.10	.14	.47*
On task					1.00	.57**	.71**	.17
Waiting						1.00	.11	.02
Distracted							1.00	.11
Instructional interaction with teacher								1.00

* $P < .05$
** $P < .01$

classroom behaviors, student learning performance and, particularly, the student perceptions of self-responsibility for school learning. The results clearly supported our general findings from the Preschool and the First-Grade Studies. The Self-Schedule System significantly affected certain classroom behaviors of the teacher and the students. The pattern of the behavior changes not only persisted through the various periods of experimental manipulations, but also prevailed when compared with results obtained from the two separate comparison groups. The results of the present study further suggested that the Self-Schedule System was effective in developing students' ability to take increasing responsibility for school learning, as well as the students' perceptions of self-responsibility for their school learning and academic achievement.

A significant contribution of the Second-Grade Study is the strong relationship between some classroom process variables and certain learning outcomes suggested by the data. The data supported our hypothesis that students' learning performance is highly related to their classroom behaviors. Furthermore, how and what students do in school also affect their perceptions of self-responsibility for school learning, as well as their ability to exert increasing control over their learning environment.

Conclusion

In spite of the preliminary nature of the data obtained from the studies reported in this paper, and in spite of the crude measures and techniques used to collect the data, some consistent patterns of effects were observed. The Self-Schedule System was implemented in three classrooms of three different age groups and, in every case, we found that when given the opportunity and the environmental support, it is possible for a student even as young as four years of age to manage and plan for his/her own school learning experiences. Moreover,

observation of the classroom processes serve to indicate that the Self-Schedule System is effective in fostering the kind of learning environment that permits the integration of the two very diverse curriculum components--the very structured basic skills learning component and the more open-ended exploratory learning component. The system permits students to engage in prescriptive learning in a relatively open environment that encourages the student to move about and interact with his/her peers freely in a manner and at a rate determined by the student's own choices and learning needs.

Specifically, the data obtained from this series of studies indicate that some clear patterns and changes in student and in teacher classroom behaviors occurred under the Self-Schedule System. The results from the studies suggest that the Self-Schedule System has significantly affected a number of classroom learning-instructional processes and certain learning outcomes. Among the more significant findings from the series of studies reported in the present paper are:

1. Strong relationships exist between learning-instructional processes and student learning outcomes. The results supported our hypothesis that how as well as what the student learns in school significantly affect learning outcomes.

2. When students are given the opportunity to plan part of their own school learning experiences, they acquire not only the ability to exert increasing control over their learning environment, but also develop perception of their self-control over how and what they do in school.

3. The Self-Schedule System has been shown to be effective as a tool for implementing the wide variety of learning experiences included in the LRDC individualized instructional programs and, in addition, it provides the needed support for teachers to function in the instructional process more as a consultant and a tutor rather than as a manager and a didactic teacher.

4. The Self-Schedule System has affected a number of processes and outcome variables that are considered important goals of adaptive education.

The documentation of the behavior changes of the teachers and the students, as well as the changes observed in the selected number of student learning outcomes in the studies reported in the present paper, have provided us with empirical inputs that are critical to forming a strong knowledge base for program development work--a knowledge base upon which further refinement of the LRDC individualized instructional programs can be made and, more importantly, upon which future work in the design of adaptive learning environments can be built.

Although the Self-Schedule System has been field tested in classrooms where the LRDC programs were used, we believe the Self-Schedule System is applicable in classroom situations where other models of individualized instruction are adopted. For example, we believe the Self-Schedule System can provide the kind of structure needed to facilitate the classroom operations in classrooms where some form of open classroom models is implemented. The Self-Schedule System offers an implementation plan that can insure the acquisition of basic skills in an open-classroom environment where student initiative and student ability to exert control over how and what he/she does in school are highly valued.

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IMPLEMENTATION AND EVALUATION OF THE SELF-SCHEDULE SYSTEM IN AN ADAPTIVE SCHOOL LEARNING ENVIRONMENT[1]

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The major purpose of this paper is to describe the experiences of implementing the Self-Schedule System (Wang, 1974) in an elementary school from the perspective of the principal of the school and the individual responsible for coordinating research and development efforts. The overall goal of the Self-Schedule System is to create an environment in which the students become more involved in decisions which control their educational experiences. The first section of the paper focuses on the procedures used to implement the system. The discussion in the second section of the paper focuses on the effects of the system on student and teacher behaviors and the implications these findings have for the design of an adaptive school learning environment.

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[1]The authors are grateful to the teachers and students of the school participating in this study for their cooperation and inputs to the development of the project. Extra support and counsel were given by Gaea Leinhardt, Dorothy Walsh, and, in particular, Jerome Rosner who provided both the impetus and inspiration for this project.

Implementation of the Self-Schedule System

Setting

The system was implemented in four classrooms in an elementary school located in the suburban area of Pittsburgh during the 1973-74 school year. The school has an enrollment of some 250 students who live in the attendance area defined by the school district.

The school was designed in 1963 as a joint venture between the Baldwin-Whitehall School District and the Learning Research and Development Center (LRDC) of the University of Pittsburgh. The school, serving as one of the LRDC developmental schools, was the first field test site for the Individually Prescribed Instructional (IPI) Program developed by LRDC. (See Appendix A.)

There are two classes at each grade level from kindergarten through grade five. Classrooms are clustered around large learning centers in the one-story building. This physical arrangement allows free access to the learning centers from all classrooms.

The school's teaching staff is fairly stable; most of the present staff have taught in the school for a number of years and are familiar with the structure and content of the LRDC-developed programs used in the school. Approximately one-half of the school day is devoted to individualized curricula programs. Classrooms can be considered self-contained for most content areas. However, subjects such as science, library skills, music, and art are taught by teachers who specialize in those particular curricula.

Planning Process

The basic idea of the Self-Schedule System was discussed during the 1972-73 school year in order to provide teachers with the opportunity to become familiar with the idea and make suggestions as to how it might work. These discussions took place during regulary scheduled

90-minute weekly meetings called planning sessions. Planning sessions gave staff and administrators considerable opportunity to construct and detail a model for implementing the system well in advance of its implementation. Planning became more intense and some definitive actions were taken during the summer months and in the planning period at the beginning of the 1973-74 school year.

Teacher Role

Cognizant of the fact that teachers determine the success or failure of any innovative program, the principal made teacher input and involvement an integral and vital part of the planning process. In the initial sessions, the teachers realized that, under the system, they would need to spend a greater amount of time planning with individual students and guiding them in their decisions about what and how they would carry out their individual work plans. During these planning sessions, therefore, a great deal of the discussion focused on both pros and cons of what the teachers could or could not do in this new organizational pattern. Their suggestions and anticipations were given high priority in the design of the strategies for installing the system in their classrooms.

During the summer months of 1973, considerable thought was given to the implementation strategies and steps that should be taken in order to implement the system at the beginning of the 1973-74 school year. These included preparation of a flexible schedule that would make the change workable, and arranging for materials, furniture, and equipment needed for efficient operation of the program. Anticipation of problems that could arise and how to cope with them were emphasized. The specific topics considered during these sessions included:

1. Record keeping.
2. Student planning.

3. Prescription writing.
4. Management of selected reading.
5. Use of the science classroom.
6. Self-selected activities.
7. Seminars.
8. What happens when a student does not complete his/her prescription.
9. Arrangements of rooms to accommodate the change.
10. Materials available and materials needed.

Plans were formulated for handling the details of the program. Perhaps one of the most important outcomes of the planning sessions was the decision that the implementation of the program would be on a gradual basis. Another important outcome was the adoption of a formative evaluation plan for making necessary changes as implementation problems arose.

What was going to happen when the program started with students was one of the main concerns. A two-day workshop was held before school started during which plans were finalized. The teachers were given the freedom to introduce the program in the manner which they felt would be best for their students and for them.

The fourth and fifth grades in the school were selected for the initial phase of implementing the system. There were two classrooms at each grade level; therefore, there were a total of four classrooms in which we could concentrate our efforts. The major reason for selecting these particular classes was because we had four teachers whom we felt could work together collaboratively and would give us critical feedback information about their implementation problems and suggestions for refinement of the system.

Principal's Role

In implementing an innovative program such as the Self-Schedule

System, the principal must assume a unique role. Many of the duties are the same as those that exist in any school, such as providing adequate supplies and materials for the operation of the program, scheduling of activities which must be included such as art, physical education, and music, and evaluation of teacher performance. However, the principal has the added responsibility of monitoring the implementation process of an innovative program and to keep the operation of the program within the limits of the policies and procedures dictated by the school district.

One of the most important responsibilities of the principal is in the planning sessions. Once each week, a 90-minute period is provided for teachers to meet as a group during the school day. It is at this time that we discuss what is happening and jointly share ideas as to what should or could be done. However, the principal must keep things balanced in terms of meeting the teachers' and students' needs as well as expectations from the school board.[2] Therefore, the principal must also recognize the fact that it is necessary at times to make decisions that are not popular but are most beneficial to the program. The principal must be an active participant in the planning and implementation of the program as a listener, a diagnostician, a monitor, and an expediter.

As was previously mentioned, the implementation was gradual. At first, planning for students was done on a daily basis; gradually, it was changed to weekly. Initially, many problems were encountered. Teachers were spending an inordinate amount of time in planning their work for the next day or for the next week. Much of this planning was being done after school hours and was placing too much of a demand on the teachers' time. Planning sessions were devoted to discussions concerning the problems that existed and to developing alternatives that would alleviate the situation. The general philosophy of self-scheduling was the same in all four rooms but the procedures differed in accordance with the personality of the teacher and also the nature of the students in each classroom.

Because the implementation of the system required a great deal of structuring and planning on the part of the teacher and a great deal of change in the organization of the school, at one point the principal was ready to give up the entire idea and return to former procedures. The principal's biggest concern was the time demands placed on the teachers. The principal argued that if the Self-Schedule System was as good and beneficial for the students as was believed, it should not require this excessive amount of preparation time. However, the teachers decided that they wanted to continue with self-scheduling and took the initiative to develop procedures that could decrease the planning time.

Initial efforts were truly cooperative on the part of the teachers, administrators, coordinators, and the researchers from LRDC. Problems were handled as quickly as possible and changes were made if it was felt that they would improve the implementation process. A constant and central concern was whether the system had been instituted for the school's convenience and comfort or to really help the children. At the beginning of the program, the teachers' discomforts were intensified rather than lessened. However, after more experience with the program, teachers' anxieties decreased. We found that children could, with some training, learn to manage their time, make decisions, and still accomplish as much or more than they had under the Block Schedule System. One most exciting outcome came by the end of October. By then, all of the classrooms were operating smoothly with a minimum amount of teacher preparation time required and we were at a point in the implementation process that we had not expected would be accomplished until December.

Implementation Process and Problems

During each school day, a period of usually two and one-half to three hours was allotted for the children to work on their math, reading, spelling, and also a variety of self-selected activities of the students'

choice. These self-selected activities were carefully chosen. They were designed for enrichment as well as for further development of certain specific objectives included in the program. At first, each student was given prescriptions in each of the curriculum areas on a daily basis by the teachers. The prescriptions were made in terms of work to be completed rather than time to be devoted to each activity.

After a short time, it was learned that this particular plan was placing too much planning burden on the teacher and, furthermore, the students really did not have the opportunity to be actually involved in the planning of their school day. Several alternative procedures were devised to alleviate this problem. Weekly planning conferences between the teacher and individual students were instituted, and these conferences were generally held on Fridays. During the conferences, the teacher and the student jointly planned their activities for the coming week. This plan worked fairly well but it did not completely solve the problem. Some children really responded to the conference and they were able to plan and even prescribe for themselves with a minimum amount of assistance from the teachers. However, this strategy did not work for all of the children. Some alternative plans had to be developed to help them.

A deliberate attempt was made to help these students develop the ability to set their goals during the conferences. The students, with guidance from the teacher, were encouraged to set goals for themselves and specific focus was placed on helping them to assess realistically what they thought they could accomplish in a week's time. Negotiation between students and teachers about the weekly goals during the conference became an integral part of their discussion. In addition to selecting their own goals, the students were also encouraged to build into their weekly schedule any additional activities such as attending individual music lessons, speech therapy classes, or resource room activities for special help in areas in which they needed additional instruction.

Based on the goals set during the conferences, the students made the decision as to what content area or which activity they were going to work on first, second, or third. Therefore, at any given time during a school day, one could find some students working on math, some on reading, some on spelling, and others on self-selected activities. As the students carried out the activities they had planned, they could seek teacher help if needed. If the teacher was not available at the time the students needed help, the Self-Schedule System allowed the students to alter their plans and work in another content area or activity until the teacher was available to help them.

One of the positive aspects of the Self-Schedule System is the fact that the students do not have to waste time while they wait for the teacher to help them. They have other work to do and they can work on that until they receive the help needed.

The system is not implemented during an entire school day. Specific time periods are scheduled for the entire class for certain subject areas such as social studies, language arts, health, music, physical education, etc. Special seminars are often scheduled for the total class if the teacher detects a given curriculum area in which all students need additional work. Providing situations in which students have opportunities to work as a group is also considered a critical aspect of the students' learning experiences in school.

The teacher's role is quite different under the Self-Schedule System. The teacher functions more as a consultant and adviser rather than a didactic instructor. The teacher generally moves from child to child and gives assistance and instruction to each child where needed. For example, as the teacher travels among the students, prescriptions which are not appropriate for a given child can be rewritten. The teacher may advise a student as to what areas he/she should pursue next in order to accomplish certain specific goals. These contacts are usually short but it gives the teacher an opportunity to have individual

contact with each child as frequently as needed. If a longer contact with any given student is needed, such as tutoring in a particular skill, self-scheduling provides flexibility in the teacher's time.

Checks and balances have been built into the design of the Self-Schedule System so that monitoring of student activities and progress can be facilitated. A pass system is employed wherein each room is allotted a specific number of passes for certain student-selected activities such as the use of computers, teletypes, science rooms, and library. When these passes are in use, no one else in that room can select those activities until someone returns. These is also a sign-out sheet and the students are responsible for taking care of this notation. This also is useful in that it controls the number of people in any given place at a given time and provides more effective use of the facilities available.

To provide the teacher with more accurate information about the student's progress, a computer program (Carlson, Fitzhugh, Glaser, Hsu, Jacobson, Pingel, Puente, Roman, & Rosner, 1974) was designed to provide weekly printouts indicating the status of each student in mathematics. The printout includes information on the unit in which they are working, the number of days they have been in that unit, and their performance on pre- and posttests. If a child has been in a math unit more than the mean number of days that it takes most students to complete this unit, the child's name is flagged and this immediately alerts the teacher to look at this child's work and attempt to assess the difficulty and perhaps plan an alternative method of instruction.

The teachers are responsible for writing specific prescriptions for each child when needed and also for monitoring their progress as shown on their individual schedules and for checking the tasks that have been accomplished. The principal attempts to schedule at least one non-teaching period each day so that these tasks can be accomplished. If it is not possible, the teacher does this either before or after school. Through studies that have been conducted, it is evident that these

teachers are well aware of where each student is in the curriculum, the type of workers they are, and what materials are best to use for their instruction.

Introducing the Self-Schedule System to Parents

At a PTA meeting, the rationale and design of the Self-Schedule System was first explained to the parents. Following the presentation, the parents were divided into small groups to meet and discuss with individual teachers any questions they had regarding the system.

Later in the year an Open House was held for National Education Week. The parents were invited to visit the school with their children. This gave the students the opportunity to explain the system to their parents from their own firsthand experience. Many parents commented that there was a carryover of self-scheduling from the school to after-school activities at home. Some students were scheduling their time at home in much the same manner as they were doing in school.

A program for parent classroom visits was organized. Letters and "reserved seat" tickets were sent by mail to each parent indicating a date and time that they could visit the school to see the program and their child in action. Rules governing attendance were provided to inform parents that their role was to observe and not participate in normal classroom operations. Several parents requested tickets for either second visits or visits for other family members. Feedback, overwhelmingly positive, was collected via a follow-up questionnaire. The program was regarded as one of the most successful public relations activities that the school had ever had.

The remainder of this paper will present evaluative data, both formative and summative, concerning the implementation of the model in the intermediate grades. The formative data deals with the initial implementation in grades four and five. Summative data resulted from a planned evaluation in two third-grade classrooms.

The Pilot Study[2]

A pilot study was carried out as a formative evaluation to investigate effects of the initial implementation efforts in installing the Self-Schedule System in the two fourth-grade and two fifth-grade classrooms. The major purpose of the Pilot Study was to gather descriptive data to answer preliminary questions regarding the effectiveness of the implementation strategies that were employed and the effects of the system on student behaviors.

The information gained via the Pilot Study was encouraging to the developers. Preliminary evidence of desired effects exceeded expectations; and the mood of the students and teachers alike seemed high. It was clear that several of the operating characteristics of the classroom had undergone a transition.

The transition in operating characteristics affected both students and teachers. Data indicated that under the system, the student to teacher ratio (children under supervision) decreased by approximately 25%. Also within the classroom, the proportion of children who were simultaneously working on substantive curricula materials was decreased by about 15%. Other data indicate that under the system teachers are able to service the needs of their students without making students wait for attention. Since at any given time teachers had fewer students demanding their attention, teachers were able to give more attention to each student.

Students on the whole made good use of their time, spending 15% to 25% less time in each curriculum area, but accomplishing at least as many (and sometimes more) units in each curriculum area. Thus,

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[2]Complete data concerning the results of the Pilot Study was presented in the original version of this manuscript and is available upon request from the authors.

students become more efficient learners. Informal observations by the principal and other administrative staff seemed to suggest that students were able to manage themselves effectively through self-scheduling. They were productive yet comfortable and relaxed. Students enjoyed being able to plan part of their educational experience. They engaged themselves in worthwhile self-selected activities.

Also, it was learned that under the system, there was room for variance on several dimensions across the classrooms. Classes varied on the distribution of activities both within and outside the classroom. Cross classroom variance was noted in the progress, efficiency, and use of time relative to specific curriculum areas.

Teachers were pleased with the management model of the system. They expressed satisfaction with the way children performed on a daily basis and with their productivity over time. Teachers expressed comfort with their ability to engage in longer conferences with individual students. They stated that the system afforded them a better opportunity to work with those children who they believed needed considerable teacher attention. The general conclusions drawn from the investigation of the model used in the intermediate grades were indeed positive. Student performance was at least as good as under the traditional management model. Teacher efficiency was enhanced. Greater utilization of time and space within the school building was possible. Perhaps most important was the belief that the system enhanced the overall goals of the total LRDC adaptive education model by serving students' needs on an individual basis.

The Third-Grade Study

Based on the findings of the Pilot Study, a decision was made to expand implementation to the two third-grade classrooms to further investigate the effects of the Self-Schedule model. The conditions under which the Third-Grade Study was carried out afforded at least one

significant advantage over those of the Pilot Study. Those children and classrooms involved had operated under the traditional management scheme for half of the school year. Because baseline data were collected while the traditional model was in operation, several direct comparisons of the two systems were possible on a number of variables.

In one sense, the summative evaluation served as a replication for the Pilot Study. All of the issues dealt with in the Pilot Study were also of concern in the evaluation study. Though more detailed evidence was gathered from the Third-Grade Study, the opportunity to replicate earlier results was built into the evaluation plan.

Goals

In order to evaluate the extent to which the Self-Schedule System contributes to the adaptive nature of the total learning environment, the study focused on documenting the following adaptive goals that have been identified and predicted as characteristics of the system:

1. Low student/teacher ratio.
2. Teacher attention to individual students.
3. Efficient use of time and space.
4. High student motivation.
5. Adaptability of the teacher to various activities.
6. Opportunity for student self-direction and planning.
7. Opportunity for variance between students on the amount of time spent in curricular areas.
8. Increased achievement.

Though this list of characteristics was not viewed as exhaustive, it included the major goals of self-scheduling. The task of evaluation was to identify and measure appropriate observable behaviors that could provide evidence concerning how well the goals were realized.

The Setting

The two third-grade classrooms to be studied had operated in a manner similar to the way fourth- and fifth-grade classrooms had been traditionally managed. The individualized curricula employed in the third-grade classrooms are the lower levels of the same LRDC curricula used for the fourth and fifth grades. Both third-grade teachers had at least five years of experience working with the individualized programs.

Student characteristics of the third-grade children such as IQ and standardized achievement were consistent with those of the school population as a whole. However, both classes had relatively low enrollments. There were only 18 students in each third-grade class while the class size for the school averaged 22 students.

Measures and Procedures

In order to gather information concerning the eight general goals of the system, several measures and data sources were employed. Four observation instruments were constructed for use in this study. School progress and time records were utilized, and scores from two standardized achievement batteries were employed.

One observation scheme, the Student Activity Instrument (see Appendix B) represents a refined version of a similar instrument employed in the Pilot Study and thus provided a vehicle for replication of results. Inter-rater reliability indices were estimated by having two observers independently and simultaneously record the data. This index represents the percentage of agreement between raters. The two estimates calculated were 91% and 96%.

Data were recorded in the following manner. The observer was allowed one minute to count and record the number of students engaged in each of the listed activity areas. During both the baseline period and the self-schedule period, 20 such counts were recorded. Out-of-class

activities were tallied from the student sign-out sheets in each classroom. For the baseline period, a rotating time schedule was employed to spread observations across the different individualized classes. A similar schedule was used during the self-schedule period.

Another observation measure employed was the Teacher Behavior Observation Instrument. This instrument was constructed and refined for use in this study. Via this measure, the number of contacts was recorded for each category of teacher behavior listed. (See Appendix C.) During the baseline period, observers recorded the interaction data for 5-minute periods on a rotating time schedule (beginning, middle, and end of each individualized class). Each class was observed for a total of 50 minutes. When the instrument was readministered during the self-schedule period, the observation periods were also five minutes in duration. A specific schedule was established to rotate the observations evenly throughout the 3-hour self-scheduling period. Each class was observed a total of 50 minutes as in the baseline period.

The rater reliability of this observation schedule was calculated by dividing total number of agreements by total observations. This was the same method employed for the Student Activity Instrument. The percentages of agreement between the observers were 88% and 90%.

The Distribution of Contacts Instrument developed by Leinhardt (Note 1) was the third observation instrument used. Under this scheme, observers entered the classroom with the enrollment list and recorded the frequency and duration of teacher contacts with each student. Stop watches were used and duration was recorded on the same time interval basis employed for the Teacher Behavior Instrument. Data collection was carried out during five 10-minute intervals during both the baseline and self-scheduling periods. No inter-rater reliability estimates were made; however, observers worked in pairs to reduce errors.

The On-Task Behavior Instrument employed in this study consisted of four categories: (a) on task, (b) off task, (c) system-imposed off task,

and (d) undetermined. (See Appendix D.) The data collection procedure was as follows: Observers located six students and listed their names on the observation schedule. Then in six consecutive 10-second intervals, the behavior of each child was assigned to a category. The observer himself was off task for 60 seconds except to locate six more children to observe. This process was reiterated until thirty 10-second intervals were observed for each child, a total of five minutes per child. Stop watches were employed to monitor time.

Rater reliability was estimated when two observers independently recorded the same behaviors. The index for two trials was calculated based on the percentage of agreement in coding which, in both instances, was 91%.

Data of the time spent per curriculum area and student unit mastery were readily available from regular school records. The data employed for achievement comparisons represents grade equivalent scores for both the Stanford Achievement Test (end of grade two) and the Metropolitan Achievement Test (end of grade three).

Implementation of the Self-Schedule System

From the beginning, the implementation process for third-grade classes was viewed as a considerably less difficult task than it was for the fourth- and fifth-grade classes. Both the administrative and teaching staffs had profited much from earlier experiences with the fourth and fifth grades. Many of the potential trouble spots could be discussed with the third-grade teachers. Probable solutions to potential problems were specified in advance.

The two third-grade teachers involved worked directly with the fourth- and fifth-grade teachers already operating under the system. The third-grade teachers spent several hours watching self-scheduling in action in the fourth- and fifth-grade classrooms. They met weekly since the beginning of the school year with school administrators and

fourth- and fifth-grade teachers to discuss operating procedures under the system. The third-grade teachers were anxious to begin the program and exhibited confidence in the system.

Detailed strategies for (a) prescription writing, (b) self-selected activity opportunities, (c) student planning, (d) student conferencing, (e) student assessment, (f) monitoring student progress, (g) record keeping, (h) helping students adjust to the change, (i) aide utilization, (j) materials management, (k) control of time, and (l) general operating procedures were set down for the third-grade teachers prior to the date of systems changeover.

Implementation of the system in the third grade began the first week in February. The process of changeover went well from the beginning. Teachers appeared organized, prepared, and comfortable. Students made the transition quickly and smoothly on the whole; only a few required extra direction from the teacher to make the adjustment. Students seemed to learn how to manage their time quickly and were meeting or exceeding the curricular goals set down for them consistently in less than two weeks. At this point, teachers began to counsel pupils with respect to writing their own goals and monitoring themselves on time spent in different activities.

Weekly planning sessions continued throughout the school year. These discussions were fruitful. They centered on daily operating strategies and how to help individual children become good managers of their own time.

Daily and weekly reports were prepared to help both teachers and administrators monitor student progress. Each day classroom aides entered the math activities of every student into the computer data management system (Carlson et al., 1974). At the end of each week, computer printouts detailing an individual student's unit and skill mastery were given to his/her teacher. Achievement reports on the other individual curricular areas were also prepared weekly. Daily reports

detailing the use and distribution of time by individuals across subject areas were prepared. This was collected by installing time clocks in each third-grade classroom.

Self-scheduleing continued to evolve smoothly as the school year progressed. Four weeks prior to the close of the school year, researchers re-entered the classrooms for data collection. The same observation instruments were employed to gather data on the process variables described by the baseline data. Standardized achievement tests were then administered, and reports on the curricula unit mastery of each student were prepared.

Results and Discussion

Student activity. The first set of questions dealt with in the evaluation of the Self-Schedule System centered around the distribution of student activity both within and outside the classroom. The relationships were examined in reference to three of the goals for an adaptive classroom: (a) low student/teacher ratio, (b) teacher attention to individual students, and (c) efficient use of time and space.

The Student Activity Instrument was used to gather data concerning the above goals. Table 1 details the distribution of student activity by category under both the traditional classroom management scheme and self-scheduling. Careful inspection of Table 1 indicates some differences between the traditional model and self-scheduling. The proportion of children under the direct supervision of the teacher (all in-class except off-line) decreased under self-scheduling. In Class A the decrease went from 87% to 73%. The change in Class B was from 88% to 81%. These figures indicate that the system better approximates the goal of effecting a lower student/teacher ratio (Goal 1) than did the traditional management scheme. The proportion of students under teacher supervision in third grade agrees with that noted earlier in the fourth- and fifth-grade classes. In both situations, the teacher supervised approximately 75% of the students at any given time.

Table 1

Distribution by Percent of Student Activities in Third Grade Under Traditional and Self Schedule Classroom Management Systems

Activity	Percent of Students			
	Class A (N = 18)		Class B (N = 18)	
	Traditional	Self-Schedule	Traditional	Self-Schedule
In Class				
Working independently	46	51	49	55
Small group	5	1	2	2
Large group	4		6	
Tape recorders	9	6	8	5
Waiting for help	9	3	8	2
Material management	5	2	5	3
With teacher	5	6	5	6
With aide	4	4	5	8
Off-line (self-selected activities)	1	10	3	6
Out of Class				
At computer	6	3	6	4
Library or science	2	12	2	9
Other(get materials, go to office, etc.)	1	2	1	2
Undetermined	2	1	1	

The combination of the categories of "waiting" and "material management" might be characterized as system-imposed off-task time. From Table 1 we can note that the amount of imposed off-task time decreased in both classes under self-scheduling. The changes were from 14% to 5% in Class A and 13% to 5% in Class B. Less off-task behavior seems to indicate more efficient use of time (Goal 3).

The proportion of children out of the classroom increased in both third-grade classes under self-scheduling. Class A increased from 9% to 17%. This information indicates greater utilization of auxiliary learning centers in the school via the Self-Schedule System, evidence of more efficient use of school space (Goal 2).

Teacher-student interactions. Another set of concerns in the evaluation of self-scheduling centers on how the characteristic behaviors involved in student and teacher interactions are affected by the classroom management model. Several types of related information were examined to gather evidence concerning three of the general goals of self-scheduling: Goal 2, teacher attention to individual students; Goal 3, efficient use of time and space; and Goal 5, adaptability of the teacher to various activities.

The first type of data concerning the above goals was gathered by the Teacher Behavior Observation Instrument. This information is summarized in Table 2.

Table 2

Distribution by Percent of Teaching Activities in Third Grade Under Traditional and Self Schedule Classroom Management Systems

Teaching Activity	Percent			
	Class A (N = 18)		Class B (N = 18)	
	Traditional	Self Schecule	Traditional	Self Schedule
Corrects student work	29	46	30	33
Tutors student	22	14	16	18
Conference with student	13	1	16	13
Management	23	13	23	19
Discipline	7	7	8	9
Other (Meet with parents, talk with other teachers, etc.)	4	5	5	5
Undetermined	2	2	2	4

The first three categories of teacher behavior listed in Table 2 constitute the major teaching activities of the IPI teaching model. Differences between classes and classroom management models are apparent for the first three categories as well as for the fourth category, "management." By summing the teaching activities (first three categories),

we can note a greater change in Class A than in Class B. In Class A correcting increased considerably, tutoring dropped, and conferencing remained stable. In all, the increase in curriculum-related activity in Class A went from 64% to 73%. Although there is a slight increase in curriculum-related activity in Class B, all categories remained more stable than for Class A. While self-scheduling facilitated a considerable increase in curriculum-related activity in one class, the increase for the other class was marginal.

Under self-scheduling, decreases corresponding to the increases in curriculum activity may be noted in management instructions. Though again the change is more drastic in Class A, the effect is noticeable in both classes. Increases in curriculum-related activity coupled with decreases in management activity are consistent with the second and third goals of self-scheduling. Teachers spent more class time servicing curriculum-related needs of individual students. Also, a smaller proportion of class time spent on management activities would infer more efficient use of time.

A second data source relevant to behaviors involved in student/teacher interactions was collected via the Distribution of Contacts Instrument (Leinhardt, Note 1). This technique helps to analyze the frequency and distribution of teacher contacts across pupils. The technique contrasts the expected number (under the hypothesis of uniform distribution) of contacts per pupil with the actual observed number. The relationship is calculated as follows:

$$\text{Distribution of Contacts Index} \quad \frac{\sum (\text{Expected} - \text{Observed})^2}{\text{Expected}}$$

The index indicates the relative deviation from expected behavior. Thus, the lower the number the more "evenly" the teacher is distributing attention.

From Table 3 it can be noted that, in both classrooms, a considerable increase in the length of teacher contacts was facilitated under the conditions of self-scheduling. It is likely that this effect resulted from the fewer number of children waiting for assistance under the system (see Table 2). This information also indicates more total time spent in student/teacher interactions which is the second listed goal of self-scheduling.

Table 3

Average Frequency and Time of Teacher Contacts Across Pupils in Third Grade Classroom Under Traditional and the Self-Schedule Classroom Management Systems

	Class A		Class B	
	Traditional	Self-Schedule	Traditional	Self-Schedule
Average number of contacts	9.58	8.31	7.61	7.00
Average time per contact in seconds	31.85	39.88	39.64	47.11

Cross classroom differences are evident and probably correspond to individual teaching style. In both classes the average number of contacts decreased under self-scheduling and the proportion of decrease was similar. However, the number of contacts was greater under both management schemes for Class A. Conversely, the time of contacts was greater for Class B in both instances.

The relative extent to which teachers distributed contacts evenly across pupils is indicated in Table 4. Under conditions of self-scheduling, both teachers decreased the deviation from the expected behavior and spread their interactions more evenly. Again, classroom differences are evident. The teacher in Class A, who had more but shorter interactions, distributed contacts more evenly across students than the teacher in Class B who had fewer, but longer interactions. The tendency of both teachers to see each pupil on a more proportionate basis under the Self-Schedule System may reflect the increased demands of the system. Attending to children working in several different curriculum areas is

more complicated than serving the needs of students within a single curriculum. However, lowering the proportion of children waiting for assistance may allow a teacher to keep better track of who has not been checked recently.

Table 4

Distribution Index of Teacher Contacts Across Pupils in Third Grade Classrooms under Traditional and Self Schedule Classroom Management Systems

	Class A		Class B	
	Traditional	Self Schedule	Traditional	Self Schedule
Distribution of contacts index	10.25	9.09	34.46	22.29

Use of time and space. A third general set of concerns focused on during the evaluation of self-scheduling relates to the utilization of time and space. These issues concern four of the listed goals of the system: Goal 3, efficient use of time and space; Goal 4, high student motivation; Goal 6, opportunity for student self-direction and planning; and Goal 7, opportunity for variance between students on the amount of time spent in curricular areas.

One source of information collected which related to the above goals was student time on task. Several possible schemes for gathering this data were examined. First observers entered the classroom to record anecdotal information; then a draft of an instrument evolved. As usual in constructing observation instruments, one source of difficulty was defining mutually exclusive categories of behavior. Ultimately, four such categories were chosen: (a) on task, (b) off task, (c) system-imposed off task, and (d) undetermined (see Appendix D, On-Task Behavior Instrument). On-task data is presented in Table 5.

Table 5

Proportion of On-task Behavior by Category for Third Grade Classrooms Under Traditional and Self-Schedule Classroom Management Systems

Behavior	Class A		Class B	
	Traditional	Self-Schedule	Traditional	Self Schedule
On-task	626	722	618	694
Off-task	164	152	180	153
System-imposed off-task	210	126	202	153

From Table 5 trends are apparent and they are fairly consistent between classrooms. Under conditions of self-scheduling, students in both classes increased their on-task behavior considerably. Corresponding decreases with respect to system-imposed off-task behavior may also be noted in both classes. General off-task behavior was the most stable category; both classes displayed only minor decreases in this category.

Thus, while children may daydream as often under self-scheduling they stay on task a greater proportion of the time seemingly at the expense of materials management and related behaviors. This effect is substantiated by earlier data. Children were on task more often probably because (a) fewer of them were idly waiting for teacher assistance, (b) teachers and students engaged in longer curriculum-related interactions, and (c) fewer students were engaging in materials management activities. Also, under self-scheduling, children knew that when they consistently met their academic goals, opportunities for self-selected activities would be continually provided. The above information would suggest that when time for some of the mechanical activities of the classroom is reduced, children are likely to use this time productively. This contributes to the third goal of self-scheduling, efficient use of time.

Student records were employed to describe the use of time across students in curriculum and self-selected activities. The data were

collected on a daily basis via the installation of time clocks in each classroom. Children used a different color time ticket for each activity area. Summary time data for the two third-grade classes are presented in Table 6.

Table 6

Average Minutes Spent in Third Grade for Curricula and Self Selected Activities Under the Self Schedule Classroom Management System

Activity	Class A		Class B	
	$\bar{X}$	*SD*	$\bar{X}$	*SD*
Math	2660	512	2796	194
Spelling	1465	316	1745	236
Reading	951	162	1048	212
Self-selected	1087	400	1212	302

The data in Table 6 will be examined more carefully later in relation to mastery of curriculum units. However, some general points are warranted here. One can note that in both classes children spent the greatest proportion of their time working in the math curriculum. In fact, the relative time spent was consistent in both classes for the three curricula--math, spelling, and reading. Likewise, the proportion of total time spent in each curriculum was similar in both classes. In math, Class A spent 42% of their total time while Class B spent 41%; in spelling, Class A spent 24%, Class B 26%; in reading, Class A spent 16% while Class B spent 15%.

It is interesting to note that the actual time spent in each curriculum under self-scheduling corresponds to the weightings imposed by schedule under the traditional model. Under the old system, math class was held four times weekly, spelling was scheduled three times, and reading twice. Under self-scheduling, the students decided when to do

what, but the teachers' prescription writing determined the proportion of time spent in each area.

Approximately 20% of the total recorded time in both classes was spent engaging in self-selected activities. Both classes spent slightly more time in self-selected activities than they spent for IPI reading skills. Though children had free time under the traditional management model, they did not have an opportunity to spend an amount equal to 20% of curricular time in such activities.

Again from Table 6, it can be noted that considerable variance exists between children on the amount of time spent in each curriculum. For example, the standard deviation for spelling time in Class B is 236. This figure would approximately equal 64-minute spelling classes.

The relationship between the proportion of time spent per curriculum area and the variance of time spent is an interesting one. On the average, across students, similar proportions of time were spent per subject under both classroom management systems. However, under self-scheduling, variance exists across pupils on the amount of time spent in each curriculum. Under self-scheduling, the teacher's knowledge of the particular abilities of each child can be taken into account in determining the amount of time to be spent in each curriculum area.

Student progress. Other issues relating to the use of time will be examined in relation to work accomplished by curriculum area. In February, when self-scheduling began, the computer data base was examined and a list was printed of the units accomplished for each student in math. Paper and pencil records were consulted for spelling and reading. At the close of school in June, unit mastery records were accessed. Data on time spent and units accomplished are presented in Table 7.

Table 7

Average Time in Minutes per Subject, Units per Subject, and Time per Unit for Third Grade Students Under Traditional and the Self Schedule Classroom Management Systems

	Class A		Class B	
	Traditional 101 days	Self Schedule 81 days	Traditional 101 days	Self Schedule 81 days
Math				
Average time	3600.00	2660.00	3600.00	2796.00
Average units	8.19	7.25	7.29	7.65
Average time per unit	439.56	366.91	493.83	365.52
Spelling				
Average time	2700.00	1465.00	2700.00	1745.00
Average units	42.75	28.69	43.65	32.41
Average time per unit	63.16	51.07	61.86	53.86
Reading				
Average time	1800.00	951.00	1800.00	1048.00
Average units	19.06	17.63	16.71	14.41
Average time per unit	94.44	53.94	107.72	72.71

In Table 7, time spent under the traditional model was calculated by adding together the total scheduled time for each subject area. The trends in this data are consistent across classrooms and within curriculum areas with respect to average time spent per unit. Average time per unit is used here as an index of efficiency. Differences in efficiency between classrooms were slight under the traditional management system. Under self-scheduling, efficiency differences between classrooms were slight for math and spelling. However, Class A was approximately 25% more efficient in accomplishing reading units than Class B. Class A also accomplished more total units in reading than Class B. This difference in reading units accomplished can also be noted under the traditional management scheme. The spelling efficiency was consistent between classrooms. Class B spent more time studying spelling than did Class A and, thus, accomplished more units.

These findings substantiate earlier data on efficiency. It appears that under the Self-Schedule System, children are able to accomplish curriculum units with less time investment than was necessary under the traditional classroom management scheme. However, it is also true that under self-scheduling, children spend less total time in each curriculum area. To assess whether or not children accomplish as many total units over time under the system, the data were further examined.

Table 8 shows the average number of curricular units accomplished per school day under both the Self-Schedule System and the traditional management system.

Table 8

Average Number of Units per School Day for Third Grade Students Under Traditional and Self Schedule Classroom Management Systems

Subject Area	Class A		Class B	
	Traditional 101 days	Self Schedule 81 days	Traditional 101 days	Self Schedule 81 days
Math	.081	.090	.072	.094
Spelling	.423	.354	.432	.400
Reading	.189	.218	.165	.178

In Table 8, it can be noted that classes operating under self-scheduling had a higher rate of units accomplished per day with respect to math and reading than the traditional model. Thus, it can be suggested that over equal time spans, pupils would complete more total math and reading units with self-scheduling.

This relationship does not hold true for spelling. Though children were more efficient with respect to spelling achievement under the self-schedule model, they spent proportionately less time working in spelling; therefore, over time students would accomplish fewer total units. Since

under self-scheduling, teachers control time spent with their prescription writing, it is possible that they viewed working in spelling as less important than math or reading.

With respect to time spent and unit mastery, the data indicate that several of the overall educational goals for the self-schedule model were met in these third-grade classrooms. Children made good use of their time. They spent less time to accomplish the average unit within each curriculum (Goal 3). Pupils spent less time managing materials and more time attending to their work (Goals 3 and 4). They planned their work to meet their own curriculum goals and therefore had an opportunity to spend 20% of their self-scheduling time in self-selected activities (Goals 4 and 6). The system allowed the teacher to determine the amount of time per subject for each child via prescription writing (Goal 7), but the student was able to decide when to do what (Goals 4 and 6).

However, it appears that teachers put less emphasis on spelling than either reading or math. Though children mastered their spelling units in fewer minutes on the average, their rate per day dropped under self-scheduling. Whether or not children under the system accomplished spelling units at a satisfactory rate is difficult to assess. The end-of-year standardized achievement tests shed some light on the issue. The Metropolitan Achievement Test (Elementary Form W) revealed an average grade equivalent score of 5.33 in spelling for the end of third grade. A performance of this level scores in the eight stanine of the Metropolitan norms. Also, this performance is approximately two grade levels beyond their scores at the end of second grade.

The above discussion airs another concern of the evaluation of the Self-Schedule System--overall performance on standardized achievement tests. Fortunately, school district policy for achievement tests had not changed and comparisons could be made to previous third-grade classes. Also, the two teachers involved with the system during the 1973-74 year had both been third-grade teachers during the previous year.

The 1973-74 third-grade classes which had operated part of the year under self-scheduling were compared to the 1972-73 classes that operated under the traditional classroom model. Incoming achievement level of students was controlled via the analysis of covariance. The covariate was the average grade equivalent score for the Stanford Achievement Test (Primary II, 1964) at the end of grade two. The dependent variable was the average grade equivalent at the end of the third grade on the Metropolitan Achievement Test (Elementary Level). The summary of these data appear in Tables 9 and 10.

Table 9

Analysis of Covariance - Metropolitan Achievement Average Grade Equivalent Scores for 1972-1973 vs. 1973-1974 Third Grade Students with Incoming Achievement Controlled

Class	Source	*SS*	*df*	*MS*	*F*	*P*
A	Between	16322.9	1	16322.9	12.10	.005
	Within	43172.4	32	1349.1		
B	Between	34612.1	1	34612.1	14.59	.001
	Within	87780.0	37	2372.4		

Table 10

Covariate, Dependent, and Adjusted Dependent Variable Means for 1972-1973 vs. 1973-1974 Third Grade Students

Class		Covariate Means (Stanford Second Grade)	Dependent Variable Means (Metropolitan Third Grade)	Adjusted Dependent Variable Means	*P*
A	1972 - 73	3.09	4.17	4.33	
	Self-Schedule 1973 - 74	3.33	4.99	4.77	.005
B	1972 - 73	3.73	5.23	4.93	
	Self-Schedule 1973 - 74	3.23	5.16	5.55	.001

From Table 10 one can note greater grade equivalent growth for both classes in the self-schedule group. Also, though the traditional Class B group began third grade with higher scores, the outcome means are similar. Adjusted dependent variable means for Class B reflect the relative grade equivalent growth. The adjusted achievement means for both Class A and B are approximately .5 grade equivalent years higher for the self-schedule groups than for the traditional groups.

These data clearly suggest the superiority of self-scheduling in facilitating achievement as measured by standardized tests. Though self-scheduling was in effect only 81 days of the 1973-74 school year, standard achievement rose significantly. The magnitude of the effect was similar for the classes of both third-grade teachers; however, a teacher effect is noticeable as the students of Class B performed slightly better than those of Class A under both management schemes.

Given the positive operating characteristics of the system and its general appeal, the constructors of the system at the school would have been content to demonstrate marginal or even no achievement gains. The magnitude of these effects is difficult to explain. It was noted that under self-scheduling, students were more efficient learners--their on-task behavior increased, and they generally increased their rate of mastery but it does not appear that students mastered enough extra curriculum units under the system to account for the difference. It is possible that the quality of the learning experience under the system accounts for the difference.

At least one plausible alternative hypothesis must be discussed. Class enrollment differed for the two years under comparison. Enrollment for the two traditional classrooms (1972-73) averaged 22 students. Class size under self-scheduling averaged 18. It seems quite possible that an average enrollment difference of four students could influence the achievement test performance of the class as a whole. However, it should be remembered that with class size held constant during the 1973-74

school year, students showed considerable evidence of enhanced performance under the Self-Schedule System.

Conclusions

Developers of the Self-Schedule System model at the school were satisfied with both the general descriptive data of the Pilot Study and the information gathered in the evaluation study in third grade. Much of the evidence gathered concerning the goals for self-scheduling revealed what appears to be positive effects of this classroom management system. The system might be characterized as having freedom and flexibility within the bounds of structure. The following list of operating characteristics and student outcomes was viewed as highly desirable by both school and research and development administrators:

1. Lower effective student/teacher ratio.
2. More out-of-classroom activities.
3. More self-selected activities within the classroom.
4. Less teacher time spent on materials management.
5. Increased student efficiency within curricula.
6. Increased student self-planning.
7. Increased use of auxiliary learning centers.
8. Higher proportion of curricula-related teacher and student interactions.
9. Increased duration of teacher and student interactions.
10. More even distribution of teacher contacts with students.
11. Less system-imposed off-task behavior.
12. Higher performance on standardized achievement tests.

The model developed at the school served the needs of both the school administration and research and development concerns. It provided a viable method for classroom management by which teachers were allowed more time to devote to individual students.

From the data described in this paper, it appears that the Self-Schedule System is consistent with the general LRDC goal of providing an educational environment that is sensitive and adaptive to the individual differences of students. Further research is needed, however, before confidence can be invested in this system. Adaptations of this classroom management system should be implemented and studied in different environments.

It appears that individualized or quasi-individualized curricula are prerequisite to self-scheduling. Also, auxiliary learning centers seem necessary to sufficiently reduce the effective student/teacher ratio. Frequent student data feedback mechanisms appear necessary so that teachers can have at their disposal enough information to make assessments of the work of each individual. It is likely that several modifications of the self-schedule model used at this school would be necessary before the system could be instituted successfully in a traditional school setting. But perhaps it is the traditional school setting that should be modified to fit the Self-Schedule System.

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IMPLEMENTATION OF THE SELF-SCHEDULE SYSTEM: THE TEACHER'S PERSPECTIVE

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The major purpose of the paper is to describe, from a teacher's perspective, experiences in implementing the individualized instructional programs developed by the Learning Research and Development Center (LRDC) under the Self-Schedule System designed by Wang (1974). Specifically, the paper focuses on teacher roles under the Self-Schedule System, how the system was implemented, how some of the problems encountered were solved, and most importantly, how the system affected the teaching and learning processes in the classroom.

Among the competencies that are most frequently included in a description of "master teachers" by educational theorists and practitioners is the ability of the teacher to create a stimulating and adaptive learning environment that can meet the individual learning needs of the students. In other words, a competent teacher should be able to provide a variety of learning experiences that can effectively motivate and help individual students to not only acquire mastery of such basic skills as reading, writing, and arithmetic, but also such general cognitive and social skills as inquiry and problem solving skills, independent learning skills, and the ability to make choices and decisions and to interact with others cooperatively and adaptively. While no one can deny that these are the crucial qualities that any competent teacher should have, very few educational programs have been designed to explicitly deal with the "how" aspects of helping teachers to acquire these skills, nor have programs been designed to provide the opportunity to apply these in the instructional-learning process. The Self-Schedule System, designed as an instructional-learning

management tool, not only can help the classroom teacher to acquire these skills, but also has made provisions in the design of the learning environment that demand the use of these skills.

Under the Self-Schedule System, the teacher has the basic responsibility to provide a stimulating environment, materials, motivation, and guidance. The teacher must offer opportunities that allow for challenge and discovery. Recognizing that the student needs to work on his own, look for and test information and ideas, and solve problems, the teacher's most important function is to help the students to become independent thinkers who will meet new experiences with the eagerness and capability to handle them. The most important feature in the design of the Self-Schedule System is its explicitness in specifying the teacher role in implementing the system. The teacher's ability to function under the system is not assumed. The design specifically addresses the "how" aspect of carrying out the various teacher roles.

A Typical School Day

The Self-Schedule System was implemented in a second-grade classroom in an inner-city public elementary school in Pittsburgh during the 1973-74 school year. The school, which serves as one of the LRDC developmental schools, included the LRDC individualized instructional programs as part of the curriculum for the early elementary grades. (See Appendix A.) The LRDC individualized instructional programs include two basic components: the "prescriptive" learning component and the "exploratory" learning component. The prescriptive learning component of the program includes math, reading, and perceptual skills. Learning activities included in the prescriptive learning component of the program were assigned to students on the basis of formal diagnostic test results. Exploratory learning activities are student-initiated activities. They generally include more open-ended projects that are related to such subject matter areas as math, science, social studies, reading, writing,

prereading, and language arts. In addition, they include a variety of creative arts activities, construction activities, and conceptual games.

Typically, the student receives daily assignments in the prescriptive curricula. That is, based on diagnostic test results, the student receives prescriptions in reading, math, and perceptual skills on a daily basis. Under the Self-Schedule System, no specific time block is assigned for any given learning activity. The students can work on the learning activities prescribed by the teacher in a subject area or on any exploratory learning task of their own choice at any time. Under the Self-Schedule System, the students are given the responsibility to make their own decisions on "when" they will do "what," although some parts of the "what" are prescribed by the teacher. Therefore, at any given time during the day under self-scheduling, one may find students in the room engaging in a variety of activities. One may find some working on their individually prescribed assignments, some working in small groups on projects of their own choices, some getting small group instruction from the teacher, and some getting individual help from the teacher and/or taking a diagnostic test.

A typical school day for the teacher operating under the Self-Schedule System does not differ very much from teachers operating under any other individualized instructional program. The differences lie in the "how" aspects of the instructional process rather than the "what" aspects. Major categories of teacher activities include: (a) conducting diagnostic testing and tutoring lessons (in small group or individually); (b) conducting group lessons for the entire class (e.g., spelling, writing, gym, music, social studies, presenting new materials and/or equipment, etc.); (c) circulating among students to check their work, give help when needed, ask questions about a student's work, provide guidance and directions when necessary; and (d) performing management and clerical duties that typically involve teachers in the public schools.

Because no specific time is set for performing any of the categories described above, the teachers can be more flexible in managing their school time. This flexibility in the planning of teacher time makes the Self-Schedule System unique and functional. The flexibility provides the teachers with a chance to plan and schedule their time to adapt to an individual student's learning.

Teacher Behaviors Affected by the Self-Schedule System

The fact that, under the Self-Schedule System, students can engage in different activities that require a varying amount of teacher attention at any given time enables the teachers to perform their roles more effectively and more efficiently. The following is a summary of how the system has characteristically affected our classroom teaching process.

The Diagnosis of Student Learning Needs

The Self-Schedule System allows more time to be spent with individual children as the teacher circulates about the room. The teacher is able to take the time to discuss with the individual child the process as well as the outcome of the child's work. Also, the teacher is able to observe and ask questions to diagnose a student's strengths and weaknesses so that appropriate decisions can be made to guide and promote the student's growth in various curricular areas.

Adapting Instruction to Students' Needs

The Self-Schedule System provides the teacher with more flexibility in adapting instruction to the needs of individual students through a variety of instructional modes. For example, more time is available for teachers to: (a) provide small group and individual tutoring sessions when the students have particular learning problems that require more teacher instructional help; (b) sit down with students to discuss and set their learning goals and make plans for achieving those goals; (c) provide immediate

feedback to students by discussing test results and task performance, by giving praise, and by providing guidance and suggestions for alternative ways to achieve the goals they have set out to achieve; and (d) provide opportunities for the students to discuss and share ideas and products with each other, thus learning from one another through their various learning experiences.

It is through these adaptive interactions in the instructional process that students can become increasingly aware of their own involvement and responsibility in their school learning. This in turn will motivate the student to be continually involved in planning and working towards achievement of their own goals. The key responsibility of a teacher in the adaptive instructional process can be summarized by the following quotation from Spodek (1971):

> The activities of the classroom are jointly determined by teacher and child as a result of a continued series of transactions. The content of the field determines the goals and parameters of the classroom learning environment. Children's interests and competencies determine the starting point of activities. Standards are maintained and they are high enough to be achieved while requiring a certain amount of stretching from each child. Learning is valued and progress is assessed continually. What the children do in school provides evidence of what they know and what they have yet to know. (p. 144)

Recording Student Learning Progress

Explicit in the design of the Self-Schedule System is the development of a record-keeping system that can communicate the expectations and student learning progress clearly to both the students and the teacher. Some examples of the forms used for record-keeping under the system are in Appendix E.

Management of the Classroom Learning Process

Under the Self-Schedule System, the teacher places an emphasis on self-responsibility in student learning and expects that the student wants to and can function under the system. Therefore, a mutual respect exists. The teacher shows trust in the children's ability to plan, to choose, and to complete their learning activities and this expectation generally generates the motivation on the part of the students to respond with the expected behaviors.

Increasing the students' responsibility for their own learning places concomitant responsibility on the teacher to explicitly plan and structure a learning environment supportive to the students. The environment must be organized to permit students to plan and carry out their own learning activities in school.

The Design and Management of the Classroom Learning Environment

The physical design of the classroom learning environment and specific suggestions for setting up material management rules are features of the Self-Schedule System that have been very helpful to the day-to-day operation of the classroom. The implementation of the Self-Schedule System demands that explicit structures and rules be established so that more flexibility can be provided to accommodate the individual student's learning needs and choices.

For example, the Self-Schedule System helped to establish rules for governing the number of students working in any given activity at a given time and to determine procedures for gaining access to a specific learning area or for the use of particular equipment such as a typewriter or a tape recorder. Similarly, in order to provide more opportunities for self-grouping, no specific seat assignment is made; however, for practical reasons, fixed areas are assigned for certain activities to achieve

maximum efficiency in supporting what the student wants to do. For example, areas are fixed for painting, block construction, and library.

Concerns and Problems Encountered in the Implementation of the Self-Schedule System

A concern in implementing the Self-Schedule System was that the students would not be able to complete all the assignments prescribed to them when they were given the responsibility to decide "when" to do "what." It seemed likely that when children were given a choice, they would rather spend time on exploratory tasks of their own choice than on prescribed tasks assigned to them by the teacher. This particular concern was handled in two ways: First, the students were told that both the exploratory and the prescriptive learning tasks are part of their expected learning activities per day and that they were expected to complete learning tasks in both. This expectation was further reinforced by stressing that exploratory learning tasks are as much a part of their daily work as prescriptive learning tasks. The teacher and the students jointly planned activities for both components and the students were expected to complete or meet this expectation on a daily basis. Secondly, no prior assumptions were made regarding the students' ability to manage and meet their own learning commitments.

From the very beginning, the hierarchies of competencies required of the Self-Schedule System, as outlined by Wang (1974), were followed to help the students achieve mastery of the competencies required to function in each step. For example, students were given the opportunity to plan for one hour of their school time before they were given the opportunity and the responsibility to handle the planning and the carrying out of plans for half a school day. Students were frequently reminded of how much time they had left to complete their work within a limited time period. At first, this reminder procedure was not very meaningful to most of the children because they had not yet grasped or comprehended

how long an hour or two really was. However, they became increasingly more aware of how long it would take them to complete their work each day. The time reminder then became more effective and more meaningful to them. It was not long before the children were asking how much time they had left for completing their work.

In spite of attempts to impress upon the students the importance of completing their commitments, and in spite of deliberate attempts to train students to meet their work commitments, some alternative ways had to be found to specifically help those students who were experiencing difficulties in acquiring the competencies required to meet this responsibility. The first strategy used was to take the privilege of planning away from those students who did not seem to be able to handle the responsibility. The students were told what to do first and they were not allowed to change to another task until they had completed what they were told to do. However, this strategy did not work at all. The situation became very punitive for both the teacher and the student. The students were not willing to relinquish the privilege and the responsiblity of planning for their own day. They wasted a great deal of time simply "stewing" and seemed to lose their motivation for completing the assignments.

The results suggested that by applying this alternative, the opportunity to learn how to plan and carry out plans was actually being taken away from the students; and, as a consequence, the students could not learn the skills they needed to function under the Self-Schedule System. After much deliberation, it was decided to give the Self-Schedule System a more faithful trial, that is, to emphasize, as suggested by the design of the Self-Schedule System, the positive approach by specifically spending more time working with students on the "how" aspect of meeting their commitments. Therefore, a great deal of time was spent with those students who needed extra help. The teacher discussed their work progress with them and worked closely with the individual student in planning for their work for the next day. As a result of using this positive

approach, the students' overall task completion rates increased significantly within a short period of time.

In general, the Self-Schedule System has succeeded in producing independent workers and thinkers capable of making decisions and living up to them. The most exciting effect of this system is seen in terms of the professional growth experienced by a teacher operating under the Self-Schedule System. The system gives the teacher the opportunity to get to know each of the children as unique individuals and this knowledge provides the information necessary to adapt instruction to the individual needs of the children.

Although more work and careful planning is required on the part of the teacher to provide the environmental support needed to effectively implement a Self-Schedule System, during the process of this work and planning the teacher learns more about the students and their development. There is sufficient time to work with each child, to assess his/her problems and suggest solutions, and to begin to function as a consultant and advisor to the individual student in the learning process. The main job of a teacher under the Self-Schedule System becomes one of providing environments that are challenging for students to acquire basic skills, to explore, and to discover while developing the ability to manage themselves within the environment.

The Self-Schedule System takes a great deal of learning and work on everyone's part--the teacher as well as the student. The results have been very rewarding. The Self-Schedule System truly provides the opportunity for each child as well as each teacher to be an individual and grow to his/her greatest potential as a student and as a teacher.

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APPENDICES

APPENDIX A

The LRDC Individualized Instructional Programs

by

Margaret C. Wang

The LRDC individualized instructional programs include the Individually Prescribed Instruction (IPI) program for children of elementary grades (grades one through six) and the Primary Education Project (PEP) designed for children of early childhood age (ages three through seven). Both IPI and PEP were developed to provide educational experiences that are adaptive to the learning needs of the individual student. The programs were designed with the basic assumptions that: (a) children display a wide range of differences in their entering abilities and in the ways in which they learn and acquire competencies; and (b) to provide educational experiences that are adaptive to individual differences means providing learning situations (e.g., classroom organization, learning materials, etc.) that can accommodate the needs of the individual student and, when needed, teaching the prerequisite abilities demanded by the learning situations (Glaser, 1972).

The LRDC individualized instructional programs are designed with the following guidelines (Glaser, 1968, 1972): (a) The goals of learning are specified in terms of observable student performance and the conditions under which this performance is to be manifested. (b) The learner's initial capabilities relevant to forthcoming instruction are assessed. (c) Educational alternatives suited to the student's initial capabilities are presented to him and the student selects or is assigned one of these alternatives. (d) The student's performance is monitored and continually assessed as he learns. (e) Instruction proceeds as a function of the relationship between measures of student performance, available instructional

alter atives, and criteria of competence. (f) As instruction proceeds, data are generated for monitoring and improving the instructional system.

Curriculum components of the IPI program include the Individualized Mathematics curriculum (Lindvall & Bolvin, 1966), the Individualized Science curriculum (Klopfer, 1970), and the New Primary Grades Reading System (Beck & Mitroff, 1972). Curriculum components for PEP include beginning math, classification and communication skills, perceptual skills, and the exploratory learning skills (Resnick, Wang, & Rosner, 1975).

Aspects of curriculum developed for each of the curricular components include: the specification of curriculum objectives, the sequencing of the objectives, the design of instructional and learning activities and materials, the specification of teacher and student behaviors, and the specification of procedures for diagnosing and monitoring student learning progress. Provision for the diagnosing and monitoring of individual student learning progress is at the core of the individualized instructional programs. Procedures and instruments (e.g., Cox & Boston, 1967; Wang, Note 1) for diagnosing and monitoring student learning have been designed to provide teachers with the information necessary for adapting the use of the program components to the individual students, and to communicate, on a substantive basis, with parents and others concerned with the learning progress and the development of the student.

The implementation of the LRDC individualized instructional programs in classroom settings ideally requires two adults in each class, a teacher and an aide. During the instructional period, the adults generally perform two basic roles, the "traveling" role and the "testing and tutoring" role. The traveling role requires the teacher or aide to circulate among the students, helping with their learning tasks and checking them off as they are completed, and interacting in various ways, generally for quite brief period of time. The testing and tutoring role requires the teacher

or aide to work intensively with individuals or small groups of students for such purposes as administering diagnostic tests, tutoring individual students, giving group lessons, or working with a group of students on a special learning project. The roles described above are "idealized" descriptions; in practice, the two adults fluctuate from one role to the other as need arises.

There are two basic sets of teacher functions, both necessary for smooth and effective implementation of the LRDC program in classroom settings. These are the management functions and the instructional functions. The management functions are concerned with the establishment of an effective system for classroom management. They include such functions as: the provision of materials and equipment for the various components of the program; the physical arrangement, display, storage, and maintenance of materials; demonstrating and explaining rules and the use of materials; and praising or otherwise reinforcing students for appropriate self-management activities.

Two sets of teacher instructional functions have been identified: the "didactic" and the "consultant" functions. The didactic instructional functions are related to the administering of tests associated with the formal curricula, prescribing learning tasks on a daily basis, checking prescriptive activities, and giving help on them as required. The teacher and/or the aide also assume, under the didactic instructional functions, the responsibility to conduct special tutoring sessions on certain specified curriculum objectives, as well as large or small group lessons as dictated by the various curricula and by the needs of the students.

The consultant functions are less highly structured, but like the didactic functions, they are carried out in the course of both traveling and testing and tutoring. These functions require the teacher and/or the aide to focus on observation of students' learning processes beyond what is provided in the formal tests; to use questioning and probing techniques

to stimulate development of self-reflection in problem-solving activities on the part of the students; to engage in planning with students, helping them decide what to do and how to do it; to pose problems for students to work on and to help them in planning and carrying out solutions; and to engage in games and other forms of play with the students.

No clear distinction can be made in practice between management and instructional functions--every act contributes to both. Similarly, the teacher should fulfill both didactic and consultant instructional roles. Nevertheless, the distinctions are useful as a means of describing the range of functions that teachers must meet when implementing the LRDC individualized instructional programs. The distinctions between the two functions also serve to characterize, in a general way, the teacher behaviors to be observed in an LRDC classroom.

The role of the student under the LRDC individualized instructional program centers around the management of one's own activities in learning situations (Wang, 1974). In general, the student is expected to:

1. Work on and complete certain tasks prescribed by the teacher. (The nature and the amount varies from student to student and depends on the learning needs and individual student characteristics.)

2. Work on and complete certain tasks of the student's own choice.

3. Make decisions about when to do what work. (The range of the options and the degree of control varies from age to age and from class to class.)

4. Take diagnostic tests when asked by the teacher.

5. Participate in tutoring sessions when asked by the teacher.

6. Participate in group activities when required.

7. Ask the teacher to check the work as one completes the assignments.

8. Ask for help (from the teacher and/or peers) when needed.

9. Assist others (initiates and/or when requested) for management as well as for learning purposes.

10. Follow classroom management rules.

11. Locate learning materials and equipment independently.

12. Carry out material management responsibilities (e.g., clean up, return equipment, etc.).

13. Take turns and share activities and materials with others.

14. Interact with peers for personal as well as school related activities.

15. Tolerate disruption of the activities at hand for attending certain group activities and/or certain testing or tutoring sessions.

16. Attend to the task at hand and ignore distraction from the different activities being carried out by others at the same time.

17. Budget one's own work time to meet the time constraints established for certain tasks.

The student roles listed above are behaviors required to function effectively under the LRDC individualized instructional programs. However, the ability to carry out the roles are not assumed as part of the entering behaviors of all students. Students are taught to acquire the minimum level of competence required to assume these self-management and independent learning roles.

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APPENDIX B

Student Activity Instrument

Date	Teacher

Time					
Working independently					
Small group (1 - 5)					
Large group (6 or more)					
Tapes					
Waiting (flag or hand up)					
Material handling					
Getting help: With teacher					
Getting help: With Aide					
Off-line					
At computer					
Library, science, or getting materials					
Other out of room					
Undetermined					

Category	Description
Working independently	Child is working alone in individualized curriculum.
Small group	Two to five children working in same curriculum with or without teacher.
Large group	Six or more students working in same curriculum with or without teacher.
Waiting (flag or hand up)	Child off-task and waiting for assistance from teacher.
Material handling	Child gathering, preparing, replacing, or otherwise handling curriculum materials without working with the materials.
Getting help	Student receives personal assistance from teacher or aide.
Off-line	Activity which is not curriculum related.
At computer	Child works at data point or teletype from instruction or practice.
Library, science, or getting materials	Student leaves room and signs out for one of these areas.
Other out of room	Includes music class, speech, etc.
Undetermined	Child cannot be located or accounted for.

APPENDIX C

Teacher Behavior Observation Instrument

Date	Teacher	Subject Area

KEY: A = 1-15 sec. B = 16-45 sec. C = 46-90 sec. D = 91-180 sec. E = more

Time					
Corrects Student Work					
Tutors Individual Student					
Conference for Rx					
Management Instructions					
Disciplines Student					
Undetermined					
Small Group					
Large Group					
Material Handling					
Non-Teaching Activity					
Out of Room					

Category	Description
Corrects Student Work	Teacher examines student's work. (Code this category if more than 50% of the contact time is devoted to correction only.)
Tutors Individual Student	Teacher explains a cognitive process. (Code this category if more than 50% of the contact time is devoted to tutoring.)
Conference for Rx	Teacher discusses the next assignment with student. (Code this category if more than 50% of the contact time is devoted to discussing a future assignment.)
Management Instructions	Teacher gives student(s) a task concerning the management of materials or explains a non-cognitive procedure. (Code this category if more than 50% of the contact time is devoted to management statements.)
Disciplines Students	Teacher makes statement intended to alter student behavior. (Code this category if more than 50% of the contact time is devoted to disciplinary comments.)
Small Group	Two to five students near each other working with teacher.
Large Group	Six or more students near each other working with teacher.
Material Handling	Manipulating materials to be used by students without interacting with students.
Non-Teaching Activities	Includes behavior such as talking with another adult (not aide) who enters the room, sitting at desk doing prep. work, going through folders without interacting with students.
Out of Room	Teacher leaves room for any reason.

APPENDIX D

On-Task Behavior Instrument

Observation of Pupils

School _____ Ref. No. _____

Classroom: Grade _____ Room _____ Teacher _____ Date _____

Class Activity _____ Observer _____

KEY: Each cell represents 10 seconds of observation

[ ] = On task [ ] = Off task [ ] = System-Imposed Act [ ] = Unclassified

Pupils' Name	1	2	3	4	5	6	7	8	9	10	11	12
Beg. Time = 1.												
2.												
3.												
4.												
5.												
6.												
7.												
8.												
Beg. Time = 9.												
10.												
11.												
12.												
13.												
14.												
Beg. Time = 15.												
16.												
17.												
18.												

Categories for Observation

Classification	Notation	Examples
On task	N	Working on prescription, preparing prescription, involved in selected activity, productive conversation, working on puzzle, or other "productive" selected activities.
Off task	F	Daydreaming, wandering about, watching others at self-selected activities, idle conversation.
System-Imposed Act	S	Waiting for teacher and not engaged in on-task activity, traveling or searching for materials, listening to instructions, putting away materials.
Unclassified	X	Cannot locate child, out of the room, not certain what activity is, not certain how to categorize.

APPENDIX E

Record-Keeping System

Prescription Forms

The Self-Schedule System utilizes a record-keeping system that provides information on student progress to both the students and the teacher. The student receives prescription forms on a daily basis (weekly for those who are ready to handle learning plans for a more extended period). The prescription form is an important two-way communication link between the student and the teacher. The teacher communicates to the student tasks to be done each day by indicating on the prescription sheet the date and what specific tasks the student is expected to do. Prescription forms vary from subject to subject, but generally follow the same strategy. Examples of the forms completed by one student and his teacher are on pages 113-117.

Form 1 is Michael's reading prescription. For October 21, Michael's reading assignment was workbook pages 5-27 and a progress check with the teacher. This was indicated on the prescription sheet by the teacher underlining each page Michael was to do. Once the student has completed the assignment, the teacher marks "*" or "X" on the prescription form. The "*"s and "X"s indicate that the task was completed correctly. The "X"s on Michael's reading prescription for October 21 indicate that he has completed all the assigned workbook pages and has passed the progress check satisfactorily.

Form 2 is Michael's science prescription. Dates are written next to the lesson boxes to indicate when particular lessons are to be done. Upon completion by the student, an "X" is placed in the appropriate box. Frequently, the teacher will write a brief note on the prescription form or will confer with the student to exchange additional information. (See the teacher's comment on the form.)

Form 3 is Michael's mathematics prescription. Each math unit has a pretest and posttest. This is recorded in the "Unit Test Scores" section of the form. Tasks in the unit are assigned according to performance on these tests. For example, Michael was assigned tasks in Skill B because he only receoved 1 of 5 correct on the pretest. When a math task is assigned, the teacher fills in half of a box and dates it. Upon completion, the box is filled in.

Schedule Sheet

Form 4 on page 117 is an example of the Schedule Sheet which is used to help the student plan and keep track of the learning tasks (s)he is to complete. The sheet includes all activity areas set up in the classroom. It is divided into two parts, the prescriptive and the exploratory sections.

The prescriptive section is indicated on the top part of the sheet. The teachers makes an entry of a slash ☑ to inform the student of the prescriptive areas (s)he has tasks prescribed for. The schedule sheet shows that on Monday, November 17, Michael's prescriptive assignments were in math and reading.

The exploratory section is indicated on the bottom half of the sheet. The student may choose any of the 11 areas (s)he would like to work in for the day. Michael chose the computer and the play deck as his exploratory activities.

When the student is ready to work in a particular area, (s)he punches the sheet with the time clock in the appropriate space. After the tasks have been completed and checked by the teacher, (s)he adds a cross slash, forming an ☒, to indicate that the student has correctly completed a task in that area. The student punches the clock again in the same place on the sheet, indicating to the teacher how much time was spent to perform the tasks. The students may choose whatever order they want to do their work.

For example, on Wednesday Michael chose to do his spelling first. He worked from 8:43 a.m. to 9:55 a.m. His second choice was math, and he worked from 9:56 a.m. to 11:04 a.m. This procedure is done for each of the tasks performed.

FORM I

11-8 Prescription

Michael

	1, 2, 3, 4 — 11-8-A	Cassette
Oct. 21	~~1~~, ~~2~~, ~~3~~, ~~4~~, ~~5~~, ~~10~~, ~~11~~, ~~12~~, ~~13~~, ~~14~~, ~~15~~	Workpages
	16, 17, 18, ~~19~~ — 11-8-B	Cassette
Oct. 21	~~20~~, ~~21~~, ~~22~~, ~~23~~, ~~24~~, ~~25~~, ~~26~~, ~~27~~	Workpages
Oct. 21	See your teacher OK	Progress Check 11-8

11-8 Prescription

individualized SCIENCE

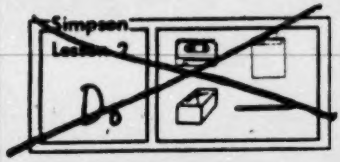
Imperial International Learning Corporation

Level A

Simpson Planning Booklet

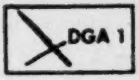
Name Michael Class

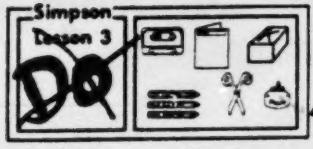
9/15



9/18

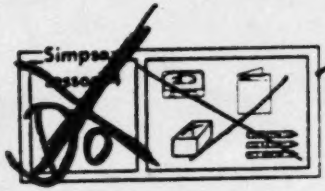
V. Good



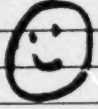


9/19

GOOD!



9/25 see teacher



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FORM 3

INDIVIDUALIZED MATHEMATICS

CLASS _____ UNIT 20

STUDENT NAME Michael

Unit Test Scores

Skill	Points	Pre	%	Post	%	Post	%	Post	%
A	2	2							
B	5	1							
C	5	4							
D	3	3							
E	5	5							
F	10	10							
G	5	3							
DATE	10/13								

A

M-20-A-1(LB)

B

M-20-B 10/14

CET

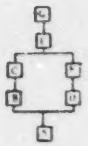
Date	Sc.	%	Date	Sc.	%
10/14	3	100			

C

M-20-C 10/15

CET

Date	Sc.	%	Date	Sc.	%
10/15	100%				



D

M-20-D

CFT

Date	Sc.	%	Date	Sc.	%

E

M-20-E-1

M-20-E

CET

Date	Sc.	%	Date	Sc.	%

F

M-20-F

CET

Date	Sc.	%	Date	Sc.	%

G

M-20-G-1

M-20-G-2

M-20-G

CET

Date	Sc.	%	Date	Sc.	%

FORM 4

Name Michael

Week Nov. 17

	m	t	w	th	f
reading					
math					
perceptual					
spelling					
exploratory					
science					

	m	t	w	th	f
1. math games					
2. library					
3. listening					
4. writing					
5. art					
6. construction					
7. games					
8. make-believe					
9. computer					
10. play deck					
11.					